STATE OF NEW HAMPSHIRE
INTER-DEPARTMENT COMMUNICATION

DATE: January 14, 2019

FROM: Matt Urban
Chief, Operations Management Section

AT (OFFICE): Department of Transportation
Bureau of Environment

SUBJECT Dredge & Fill Application
Bow, 42300

TO Gino Infascelli, Public Works Permitting Officer
New Hampshire Wetlands Bureau
29 Hazen Drive, P.O. Box 95
Concord, NH 03302-0095

Forwarded herewith is the application package prepared by NH DOT Bureau of Highway Design for the subject minimum impact project. This project is classified as minimum per Env-Wt 303.04(j). The project is located under the north bound and south bound barrels of Interstate-93 as well as the Interstate-89 Northbound on-ramp in the Town of Bow, NH. The proposed work consists of rehabilitation of a 48" CMP, 144' long, constructed in 1977, with a severely deteriorated invert. The proposed treatment is a slip lining with a 42" polymer corrugated metal liner. A detailed project description has been provided with the application package.

This project was reviewed at the Natural Resource Agency Coordination Meeting on December 19, 2018. A copy of the minutes has been included with this application package. A copy of this application and plans can be accessed on the Departments website via the following link: http://www.nh.gov/dot/org/projectdevelopment/environment/units/program-management/wetland-applications.htm

Mitigation is not proposed for this project as discussed at the Natural Resource Agency Meeting. This project will have no permanent impacts.

A payment voucher has been processed for this application (Voucher #56182) in the amount of $200.

The lead people to contact for this project are Kirk Mudgett, Bureau of Highway Design (271-2731 or kirk.mudgett@dot.nh.gov) or Matt Urban, Operations Management Section, Bureau of Environment (271-3226 or matt.urban@dot.nh.gov).

If and when this application meets with the approval of the Bureau, please send the permit directly to Matt Urban, Wetlands Program Manager, Bureau of Environment.

MRU:mru
Enclosures
cc:
BOE Original
Town of Bow (4 copies via certified mail)
Merrimack River Local Advisory Committee (via certified mail)
David Trubey, NH Division of Historic Resources (Cultural Review Within)
Bureau of Construction
Carol Henderson, NH Fish & Game (via electronic notification)
Maria Tur, US Fish & Wildlife (via electronic notification)
Mark Kern, US Environmental Protection Agency (via electronic notification)
Michael Hicks, US Army Corp of Engineers (via electronic notification)
Kevin Nyhan, BOE (via electronic notification)

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NHDES-W-06-012

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

WETLANDS PERMIT APPLICATION

Water Division/ Wetlands Bureau
Land Resources Management

Check the status of your application: www.des.nh.gov/onestop

RSA/Rule: RSA 482-A/ Env-Wt 100-900

Administrative Use Only	Administrative Use Only	Administrative Use Only	File No.
			Check No.
			Amount:
			Initials

1. REVIEW TIME: Indicate your Review Time below. To determine review time, refer to Guidance Document A for instructions.

☒ Standard Review (Minimum, Minor or Major Impact) ☐ Expedited Review (Minimum Impact only)

2. MITIGATION REQUIREMENT:

If mitigation is required a Mitigation-Pre Application meeting must occur prior to submitting this Wetlands Permit Application. To determine if Mitigation is Required, please refer to the Determine if Mitigation is Required Frequently Asked Question.

Mitigation Pre-Application Meeting Date: Month: __ Day: __ Year: ____

☒ N/A - Mitigation is not required

3. PROJECT LOCATION:

Separate wetland permit applications must be submitted for each municipality that wetland impacts occur within.

ADDRESS: **I-93 and I-89 off ramp from I-93 NB MM 35.2**		TOWN/CITY: **Bow**	
TAX MAP: **N/A**	BLOCK: **N/A**	LOT: **N/A**	UNIT: **N/A**
USGS TOPO MAP WATERBODY NAME: **trib. to Merrimack River** ☐ NA		STREAM WATERSHED SIZE: **375 ac** ☐ NA	
LOCATION COORDINATES (If known): **43.1672, -71.5259**		☒ Latitude/Longitude ☐ UTM ☐ State Plane	

4. PROJECT DESCRIPTION:

Provide a brief description of the project outlining the scope of work. Attach additional sheets as needed to provide a detailed explanation of your project. DO NOT reply "See Attached" in the space provided below.

The project involves the rehabilitation of a 48" CMP, 144' long, constructed in 1977, with a severly deteriorated invert. The proposed treatment is a slip lining with a 42" polymer coated corrugated metal liner. A detailed project description is attached.

5. SHORELINE FRONTAGE:

☒ NA This does not have shoreline frontage. SHORELINE FRONTAGE:

Shoreline frontage is calculated by determining the average of the distances of the actual natural navigable shoreline frontage and a straight line drawn between the property lines, both of which are measured at the normal high water line.

6. RELATED NHDES LAND RESOURCES MANAGEMENT PERMIT APPLICATIONS ASSOCIATED WITH THIS PROJECT:

Please indicate if any of the following permit applications are required and, if required, the status of the application.

To determine if other Land Resources Management Permits are required, refer to the Land Resources Management Web Page.

Permit Type	Permit Required	File Number	Permit Application Status
Alteration of Terrain Permit Per RSA 485-A:17	☐ YES ☒ NO	____	☐ APPROVED ☐ PENDING ☐ DENIED
Individual Sewerage Disposal per RSA 485-A:2	☐ YES ☒ NO	____	☐ APPROVED ☐ PENDING ☐ DENIED
Subdivision Approval Per RSA 485-A	☐ YES ☒ NO	____	☐ APPROVED ☐ PENDING ☐ DENIED
Shoreland Permit Per RSA 483-B	☐ YES ☒ NO	____	☐ APPROVED ☐ PENDING ☐ DENIED

7. NATURAL HERITAGE BUREAU & DESIGNATED RIVERS:

See the Instructions & Required Attachments document for instructions to complete a & b below.

a. Natural Heritage Bureau File ID: NHB **18** - **3420**.

b. ☒ Designated River the project is in ¼ miles of: **Merrimack River** ; and date a copy of the application was sent to the Local River Management Advisory Committee: Month: 1 Day: 11 Year: 2019

☐ N/A

8. APPLICANT INFORMATION (Desired permit holder)			
LAST NAME, FIRST NAME, M.I.: **NH Dept. of Transportation**			
TRUST / COMPANY NAME: **NH Dept. of Transportation**	MAILING ADDRESS: **PO Box 483**		
TOWN/CITY: **Concord**	STATE: **NH**	ZIP CODE: **03302**	
EMAIL or FAX: **Bureau16@dot.nh.gov**	PHONE: **603-271-3226**		
ELECTRONIC COMMUNICATION: By initialing here: _____, I hereby authorize NHDES to communicate all matters relative to this application electronically.			

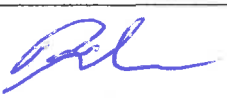
9. PROPERTY OWNER INFORMATION (If different than applicant)			
LAST NAME, FIRST NAME, M.I.: **same as applicant**			
TRUST / COMPANY NAME:	MAILING ADDRESS:		
TOWN/CITY:	STATE:	ZIP CODE:	
EMAIL or FAX:	PHONE:		
ELECTRONIC COMMUNICATION: By initialing here _____, I hereby authorize NHDES to communicate all matters relative to this application electronically.			

10. AUTHORIZED AGENT INFORMATION			
LAST NAME, FIRST NAME, M.I.:	COMPANY NAME:		
MAILING ADDRESS:			
TOWN/CITY:	STATE:	ZIP CODE:	
EMAIL or FAX:	PHONE:		
ELECTRONIC COMMUNICATION: By initialing here _____, I hereby authorize NHDES to communicate all matters relative to this application electronically.			

11. PROPERTY OWNER SIGNATURE:
See the Instructions & Required Attachments document for clarification of the below statements

By signing the application, I am certifying that:

1. I authorize the applicant and/or agent indicated on this form to act in my behalf in the processing of this application, and to furnish upon request, supplemental information in support of this permit application.
2. I have reviewed and submitted information & attachments outlined in the Instructions and Required Attachment document.
3. All abutters have been identified in accordance with RSA 482-A:3, I and Env-Wt 100-900.
4. I have read and provided the required information outlined in Env-Wt 302.04 for the applicable project type.
5. I have read and understand Env-Wt 302.03 and have chosen the least impacting alternative.
6. Any structure that I am proposing to repair/replace was either previously permitted by the Wetlands Bureau or would be considered grandfathered per Env-Wt 101.47.
7. I have submitted a Request for Project Review (RPR) Form (www.nh.gov/nhdhr/review) to the NH State Historic Preservation Officer (SHPO) at the NH Division of Historical Resources to identify the presence of historical/ archeological resources while coordinating with the lead federal agency for NHPA 106 compliance.
8. I authorize NHDES and the municipal conservation commission to inspect the site of the proposed project.
9. I have reviewed the information being submitted and that to the best of my knowledge the information is true and accurate.
10. I understand that the willful submission of falsified or misrepresented information to the New Hampshire Department of Environmental Services is a criminal act, which may result in legal action.
11. I am aware that the work I am proposing may require additional state, local or federal permits which I am responsible for obtaining.
12. The mailing addresses I have provided are up to date and appropriate for receipt of NHDES correspondence. NHDES will not forward returned mail.

⇨		
	KIRK MUDGETT	1/10/19
Property Owner Signature	Print name legibly	Date

MUNICIPAL SIGNATURES

12. CONSERVATION COMMISSION SIGNATURE

The signature below certifies that the municipal conservation commission has reviewed this application, and:

1. Waives its right to intervene per RSA 482-A:11;
2. Believes that the application and submitted plans accurately represent the proposed project; and
3. Has no objection to permitting the proposed work.

⇨	Print name legibly	Date

DIRECTIONS FOR CONSERVATION COMMISSION

1. Expedited review ONLY requires that the conservation commission's signature is obtained in the space above.
2. Expedited review requires the Conservation Commission signature be obtained **prior** to the submittal of the original application to the Town/City Clerk for signature.
3. The Conservation Commission may refuse to sign. If the Conservation Commission does not sign this statement for any reason, the application is not eligible for expedited review and the application will be reviewed in the standard review time frame.

13. TOWN / CITY CLERK SIGNATURE

As required by Chapter 482-A:3 (amended 2014), I hereby certify that the applicant has filed four application forms, four detailed plans, and four USGS location maps with the town/city indicated below.

⇨ Town/City Clerk Signature	Print name legibly	Town/City	Date

DIRECTIONS FOR TOWN/CITY CLERK:

Per RSA 482-A:3,I

1. For applications where "Expedited Review" is checked on page 1, if the Conservation Commission signature is not present, NHDES will accept the permit application, but it will NOT receive the expedited review time.
2. IMMEDIATELY sign the original application form and four copies in the signature space provided above;
3. Return the signed original application form and attachments to the applicant so that the applicant may submit the application form and attachments to NHDES by mail or hand delivery.
4. IMMEDIATELY distribute a copy of the application with one complete set of attachments to each of the following bodies: the municipal Conservation Commission, the local governing body (Board of Selectmen or Town/City Council), and the Planning Board; and
5. Retain one copy of the application form and one complete set of attachments and make them reasonably accessible for public review.

DIRECTIONS FOR APPLICANT:

1. Submit the single, original permit application form bearing the signature of the Town/ City Clerk, additional materials, and the application fee to NHDES by mail or hand delivery.

14. IMPACT AREA:
For each jurisdictional area that will be/has been impacted, provide square feet and, if applicable, linear feet of impact
Permanent: impacts that will remain after the project is complete.
Temporary: impacts not intended to remain (and will be restored to pre-construction conditions) after the project is complete.

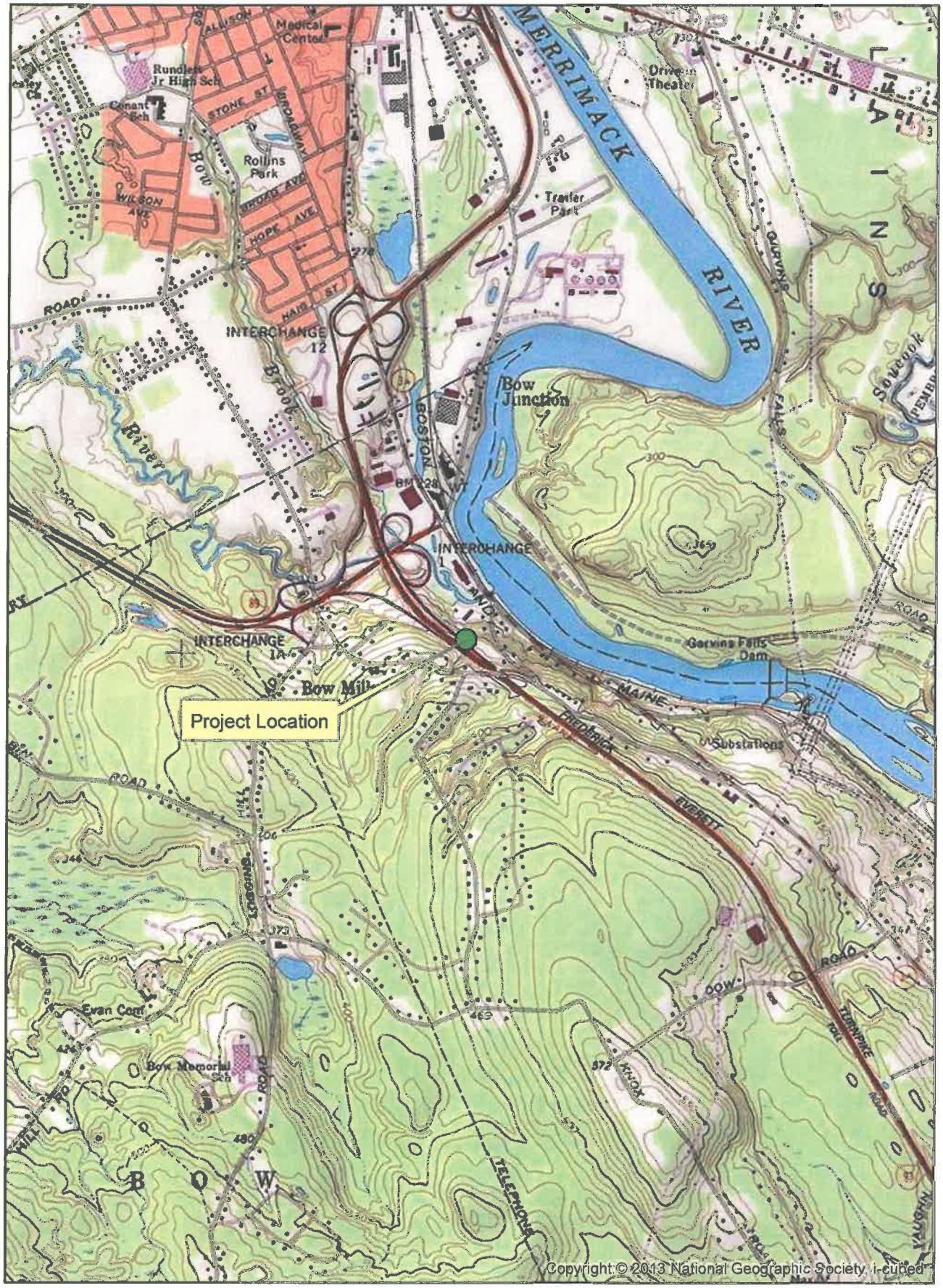
JURISDICTIONAL AREA	PERMANENT Sq. Ft. / Lin. Ft.		TEMPORARY Sq. Ft. / Lin. Ft.	
Forested wetland		☐ ATF		☐ ATF
Scrub-shrub wetland		☐ ATF		☐ ATF
Emergent wetland		☐ ATF		☐ ATF
Wet meadow		☐ ATF		☐ ATF
Intermittent stream		☐ ATF	/	☐ ATF
Perennial Stream / River	/	☐ ATF	443 / 39	☐ ATF
Lake / Pond	/	☐ ATF	/	☐ ATF
Bank - Intermittent stream	/	☐ ATF	/	☐ ATF
Bank - Perennial stream / River	/	☐ ATF	489 / 85	☐ ATF
Bank - Lake / Pond	/	☐ ATF	/	☐ ATF
Tidal water	/	☐ ATF	/	☐ ATF
Salt marsh		☐ ATF		☐ ATF
Sand dune		☐ ATF		☐ ATF
Prime wetland		☐ ATF		☐ ATF
Prime wetland buffer		☐ ATF		☐ ATF
Undeveloped Tidal Buffer Zone (TBZ)		☐ ATF		☐ ATF
Previously-developed upland in TBZ		☐ ATF		☐ ATF
Docking - Lake / Pond		☐ ATF		☐ ATF
Docking - River		☐ ATF		☐ ATF
Docking - Tidal Water		☐ ATF		☐ ATF
Vernal Pool		☐ ATF		☐ ATF
TOTAL	/		932 / 124	

15. APPLICATION FEE: See the Instructions & Required Attachments document for further instruction

☐ Minimum Impact Fee: Flat fee of $ 200
☒ Minor or Major Impact Fee: Calculate using the below table below

Permanent and Temporary (non-docking)	**932** sq. ft.	X	$0.20 =	**$ 186.40**
Temporary (seasonal) docking structure:	sq. ft.	X	$1.00 =	$
Permanent docking structure:	sq. ft.	X	$2.00 =	$
Projects proposing shoreline structures (including docks) add $200			=	$
			Total =	**$ 186.40**
The Application Fee is the above calculated Total or $200, whichever is greater			=	**$ 200.00**

Bow 42300


N
MERRIMACK RIVER
Project Location
INTERCHANGE 12
INTERCHANGE 1
INTERCHANGE 1A
Bow Junction
Bow Mill
Gervins Falls Dam
Rundlett Jr High Sch
Rollins Park
Trailer Park
Drive-in Theater
Medical Center
Conant Sch
Bow Memorial Sch
Evan Cem
Substations
Copyright © 2013 National Geographic Society, i-cubed
0
0.25
0.5
1 Miles
1:24,000

CULVERT REHABILITATION

I-93 / I-89 OFF RAMP FROM I-93 NB

BOW, NH

NHDOT PROJECT NO. 42300

SUPPLEMENTAL NARRATIVE

Project Description

The project involves the rehabilitation of a 48" corrugated metal culvert. This culvert carries a Tier 2 perennial stream under the I-93 NB off ramp to I-89. The project is Turnpike funded (non-federal). The culvert was constructed in 1977 and has a severely deteriorated invert. The proposed rehabilitation treatment is slip lining with a 42" diameter polymer coated corrugated metal liner. Incidental work includes replacing a closed drainage pipe under the ramp, extending an 18" slope drain, minor repairs to stone headwalls, and resetting existing riprap. All work will be within the existing ROW.

The crossing begins as a 48" concrete pipe on the southbound side of I-93, constructed in 1957. The concrete pipe is in good condition and no repair work is proposed. Minor repairs to the stone inlet headwall are included. A water diversion will be required at the 48" rcp inlet. Stream flow will be pumped to a catch basin in the I-93 ditch line located about 400' north of the 48" rcp inlet. Base flow in the stream in low flow periods is expected to be less than 0.5 cfs. No tree clearing or significant ground disturbance is anticipated at the 48" rcp inlet.

In 1977, Project P1555K widened I-93 in the area of this crossing and constructed the I-89 off ramp. The 48" rcp outlet was connected to a junction box and the crossing was extended with 144 LF of 48" cmp. The junction box is currently located between I-93 NB and the I-89 off ramp under approximately 23' of fill. The 1977 project connected a portion of I-93 closed drainage to the junction box with a 15" cmp, which has failed and was causing sinkholes. The most recent I-93 construction project was unable to replace the 15" cmp due to depth and made a temporary repair, but formation of sinkholes continued. In the fall of 2018, Turnpike forces plugged the 15" cmp and installed a new 18" plastic slope drain outlet for the closed drainage system. As part of the 42300 project, the 15" rcp under the ramp will be replaced with an 18" rcp such that the closed drainage system has a proper connection to the new slope drain outlet. The 18" plastic slope drain will be extended and a new riprap apron will be constructed about 30' uphill of the existing 48" cmp outlet.

Prior to lining, the 48" cmp will be cleaned and inspected for voids. If necessary, voids outside the 48" cmp will be filled by pressure grouting. The 48" cmp has a 30 degree bend near the outlet which will need to be removed to accommodate insertion of the liner segments. Length of liner segments will be limited to about 10' to minimize the amount of excavation necessary. The intent is not to disturb the existing stone headwall at the 48" cmp outlet, which is in good condition. The project will provide for minor repairs the stone headwall. After lining the upstream portion of the 48" cmp, the 42" cmp liner will be extended, fitted with a new 30 degree bend, and extended through the remaining segment of 48" cmp within the headwall. Annular

space between the 42" and 48" cmp's will be grouted. The 15" cmp connected to the junction box will be plugged. The existing lengths and slopes of the 48" cmp will be unchanged. The inlet and outlet inverts will be raised by approximately 2". Existing stone channel protection at the 48" cmp outlet will be reset to make a smooth transition from the new 42" invert to the existing stream bed. Excavation for insertion of the liner is expected to generate about 50 CY of material, which will be temporarily stockpiled adjacent to the excavation. Excavation for the slope drain apron is expected to generate about 20 CY of material. Topsoil from these excavations is classified as Limited Reuse Soil (LRS). LRS will be reused in the immediate vicinity of the excavations. Tree clearing for access and staging at the outlet is estimated at 3,600 SF. Seeding, mulching, and temporary erosion control balnket will be used as necessary to establish a vegetative cover on disturbed areas above top of bank.

Temporary wetland impacts are required for the installation of a temporary water diversion at the 48" rcp inlet and for resetting existing riprap at the 48" cmp outlet. No permanent wetland impacts are proposed.

Traffic impacts will be limited to shoulder closures on I-93 NB and SB for the majority of the work. Replacement of the pipe under the I-89 off ramp will require closure of the ramp for a few nights. Ramp traffic will be detoured to the Exit 12 interchange. The ramp will be re-opened during non-work hours.

The project is expected to take 4 - 6 weeks to complete, with construction anticipated to begin in the summer of 2019.

Existing Conditions

There are no reports of flooding or damage associated with this crossing.
The 48" rcp runs about 180' at 9% slope under I-93 NB and SB to a buried junction box.
The 48" cmp is 144' long, 15% slope, with a 30^ bend near the outlet.
The 48" cmp outlet is about 700' from Merrimack River.
The 48" cmp invert is severely deteriorated with perforations along the majority of its length.
Sinkholes are forming at the outlet end near the bend and behind the stone headwall.
The 48" cmp outlet is perched about 12".
The 1977 project constructed stone lined channel and banks to 100' downstream of the 48" cmp outlet.

The culvert is not located within a mapped 100 year floodplains.

Overhead and underground utilities are present but, no conflicts are anticipated. No commercial or residential properties are within the project limits. All work will be within the existing ROW.

Alternatives

Culvert rehabilitation options considered included concrete invert lining, cured in place lining, and metal and plastic pipe liners. Preliminary estimates for the rehabilitation methods considered had similar costs and no effect on the overall capacity of the crossing. All rehabilitation options require removing the 30 degree bend and some pipe at the outlet for access.

An HDPE liner would the most durable, but it had a very large increase in outlet velocity, and the highest cost. Cured in place lining is also relatively expensive and would also cause a significant increase velocity. Shotcrete invert repair is typically the least expensive, but cost may be higher than anticipated due to difficult access and variable depth of rust line. The 42" corrugated metal liner has the least increase in outlet velocity and relatively low cost. Using the maximum available metal thickness (10 gage) and adding polymer coating increases the predicted service life to at least 50 years.

Hydraulic Analysis

Hydraulic analyses of the existing and proposed conditions were conducted to ensure that the conveyance and hydraulic conductivity of the stream crossings are adequate during significant rainfall events. FHWA's HY-8 Culvert Analysis Program was used for hydraulic modelling.

The drainage area was determined from Streamstats. Boundary compared favorably with lidar. Drainage area to the 48" rcp inlet is 375 ac, classified as a Tier 2.

Flow estimates from Streamstats: Q50 = 63 cfs Q100 = 78 cfs

The crossing was modelled as two separate culverts, which is a conservative method in this case. Modelling as a closed drainage system with the two 48" pipes connected by a junction box would result in a more efficient transition between the two pipes and lower pressure inside the junction box, but would not affect the capacity of the 48" rcp inlet. Both culverts operate in inlet control due to the steep slopes. Capacity is controlled by the inlet opening and inlet geometry.

The inlet capacity of the existing 48" rcp is about 165 cfs at headwater depth of 7'.
At headwater depths over 7', excess flow will bypass north along the I-93 ditch line.
About 9' of headwater depth is required to pass 165 cfs through the 48" cmp inlet vs
16' of available depth (elevation difference between the 48" rcp inlet and junction box invert)

A beveled edge will be used to transition from the 48' opening in the junction box to the 42" liner. About 12' of headwater depth is required to pass 165 cfs through the 42" cmp with beveled inlet edge, which is still less than the 16' available headwater.

The proposed slip lining will have no effect on the 48" rcp inlet capacity and no effect on the overall capacity of the crossing.

Q100 outlet velocity for the existing 48" cmp is approximately 19.5 ft/s.
Q100 outlet velocity for the proposed 42" cmp liner is approximately 20 ft/s.

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

WETLANDS PERMIT APPLICATION – ATTACHMENT A
MINOR AND MAJOR - 20 QUESTIONS

Land Resources Management
Wetlands Bureau

Check the Status of your application: www.des.nh.gov/onestop

RSA/ Rule: RSA 482-A, Env-Wt 100-900

Env-Wt 302.04 Requirements for Application Evaluation - For any major or minor project, the applicant shall demonstrate by plan and example that the following factors have been considered in the project's design in assessing the impact of the proposed project to areas and environments under the department's jurisdiction. Respond with statements demonstrating:

1. The need for the proposed impact.

The project is needed to address a pipe crossing that begins as a 48" concrete pipe on the southbound side of I-93, constructed in 1957. It runs about 180' under I-93 NB and SB to a buried junction box and changes to a 48" corrugated metal pipe, constructed in 1977. The 48" metal pipe is 144' long, 15 percent slope, with a 30 degree bend near its outlet. The invert is severely deteriorated with perforations along the majority of its length. Sinkholes are forming at the outlet end near the 30 degree bend and behind the stone headwall. The 48" rcp inlet headwall also needs repair.

2. That the alternative proposed by the applicant is the one with the least impact to wetlands or surface waters on site.

Rehabilitation of the existing culvert (proposed action) has the least impact to wetlands. Replacement would involve significantly more impacts due to the depth of fill over the pipe.

Several rehabilitation options were considered includeing polyethylene liner, cured in place liner, and concrete invert repair. Poly liner was the most expensive and had the largest velocity increase, followed by cured in place. All of these options have similar temporary impacts, all would have a larger velocity increase than the proposed corrugated metal liner.

3. The type and classification of the wetlands involved.

The wetland resources that will be impacted include the channel and banks of an unnamed tributary to Merrimack River

Classifications are R2UB1/2, Bank

4. The relationship of the proposed wetlands to be impacted relative to nearby wetlands and surface waters.

Impacts include the banks and channel of an unnamed perennial tributary to the Merrimack River.

The culvert outlet is approximately 700' upstream of the Merrimack River.

There are no other wetlands within the project limits.

5. The rarity of the wetland, surface water, sand dunes, or tidal buffer zone area.

The wetlands and streams within the project area are typical of the region and are not considered to be rare.

6. The surface area of the wetlands that will be impacted.

No permanent wetland impacts are proposed for this project. A detailed breakdown of the temporary impacts includes:

- **Temporary perennial stream impact = 443 SF / 39 LF**
- **Temporary bank impact = 489 SF / 85 LF**

Temporary impacts are proposed for resetting existing stone at the 48" culvert outlet and for installation of a water diversion at the 48" culvert inlet. As per discussion at the December 19, 2018 NHDOT Natural Resource Agency Coordination meeting, work within the existing pipes has not been included as channel impacts.

7. The impact on plants, fish and wildlife including, but not limited to:
   a. Rare, special concern species;
   b. State and federally listed threatened and endangered species;
   c. Species at the extremities of their ranges;
   d. Migratory fish and wildlife;
   e. Exemplary natural communities identified by the DRED-NHB; and
   f. Vernal pools.

a. No species were identified by the NHB search.

b. The proposed project was reviewed for its potential to have effect on the existence of any threatened or endangered species and/or their habitat. The results of the US Fish and Wildlife Services IPAC consultation has picked up on the Northern Long-eared Bat (NLEB) and the Small Whorled Pagonia as federally listed species known to occur within the state. However, the report also indicates that the proposed project area is not located within a known critical habitat for either species. The proposed project will not result in any tree clearing. The Department will complete the 4(d) consultation with US Fish and Wildlife Services, in regards to the NLEB, prior to any work. The project area was also field reviewed in August of 2018 and it was determined that there were no Small Whorled Pagonia in this project area and that the surrounding habitat was not suitable to support this species.

c. No species were identified as being at the extremities of their ranges.

d. Consultation with NH Fish and Game determined that the existing pipe configuration (slope and length) was impassible to most fish.

e. No Exemplary Natural Communities were identified by DRED-NHB.

f. NO vernal pools were present at this project location.

8. The impact of the proposed project on public commerce, navigation and recreation.

The project will not impact public commerce, navigation, or recreation. The stream within the project area is not large enough to be used for public commerce or navigation.

The project area is not used for recreation since it is located along ramps and embankments for the I-93 / i-89 interchange. Areas impacted by the project are all within the existing ROW. Best Management Practices (BMPs) will be used during construction to minimize any downstream water quality impacts that could affect recreational use along the Merrimack River.

Traffic impacts will be limited to shoulder closures on I-93 NB and SB for the majority of the work. Replacement of the pipe under the I-89 off ramp will require closure of the ramp for a few nights. Ramp traffic will be detoured to the Exit 12 interchange. The ramp will be re-opened during non-work hours.

9. The extent to which a project interferes with the aesthetic interests of the general public. For example, where an applicant proposes the construction of a retaining wall on the bank of a lake, the applicant shall be required to indicate the type of material to be used and the effect of the construction of the wall on the view of other users of the lake.

The proposed culvert rehabilitation will not interfere with the aesthetic interests of the general public. Post construction conditions will be similar to existing conditions and no adverse visual impacts are anticipated.

Some vegetation clearing (approximately 3,600 SF project total) will be required for construction access and staging at the culvert outlet. This will result in temporary visual impact. Areas impacted by the construction access routes will be restored once construction is completed and vegetation will be allowed to re-establish naturally.

10. The extent to which a project interferes with or obstructs public rights of passage or access. For example, where the applicant proposes to construct a dock in a narrow channel, the applicant shall be required to document the extent to which the dock would block or interfere with the passage through this area.

The project will not permanently interfere with or obstruct public rights of passage or access. No permanent changes to the I-93 or I-89 interchange are proposed. Minor temporary traffic impacts during construction are anticipated.

11. The impact upon abutting owners pursuant to RSA 482-A:11, II. For example, if an applicant is proposing to rip-rap a stream, the applicant shall be required to document the effect of such work on upstream and downstream abutting properties.

The project will not have any effect on abutters. The proposed work will not change off-site flow conditions or water levels. Temporary impacts are all within the existing ROW.

12. The benefit of a project to the health, safety, and well being of the general public.

The project will improve safety by repairing one deteriorating culvert on a highway. The existing culvert currently has severe corrosion along its invert and substantial portions of missing invert. Rehabiliting the culvert will keep the existing culvert functioning as designed with minimal disturbance to the traveling public and prevent the potential collapse of the culvert.

13. The impact of a proposed project on quantity or quality of surface and ground water. For example, where an applicant proposes to fill wetlands the applicant shall be required to document the impact of the proposed fill on the amount of drainage entering the site versus the amount of drainage exiting the site and the difference in the quality of water entering and exiting the site.

The project will not result in any changes in impervious surface or flood storage capacity, so no changes in the quantity or quality of stormwater runoff are anticipated. There are no permanent wetland impacts proposed for this project. No drainage changes are proposed, with the exception of raising the culvert invert by 2" and extending the 18" plastic slope drain to the toe of slope. These changes will not have any impact on surface or groundwater within the project area.

Temporary impacts to water quality during construction will be minimized through the use of erosion and sedimentation controls.

14. The potential of a proposed project to cause or increase flooding, erosion, or sedimentation.

The proposed culvert rehabilitation will have no effect on the capacity of the crossing. Outlet velocity increase will be approximately 0.5 ft/s and no downstream impacts are expected since the channel is currently armored with stone. No change to sediment transport capacity is anticipated.

15. The extent to which a project that is located in surface waters reflects or redirects current or wave energy which might cause damage or hazards.

N/A

16. The cumulative impact that would result if all parties owning or abutting a portion of the affected wetland or wetland complex were also permitted alterations to the wetland proportional to the extent of their property rights. For example, an applicant who owns only a portion of a wetland shall document the applicant's percentage of ownership of that wetland and the percentage of that ownership that would be impacted.

Temporary stream impacts are limited to small areas on each end of the crossing as needed to perform the culvert rehabilitation. Cummulative impacts that would result from abutting property owner actions would likely not be substantial if the abutters' impacts were also limited to small temporary impacts for the rehabilitation of existing structures.

17. The impact of the proposed project on the values and functions of the total wetland or wetland complex.

Since the project involves only the rehabilitation of one existing culvert and the extension of one slope drain, no substantial impacts to the values and functions of the stream and wetland complexes are anticipated. No permanent impacts are proposed for this project. Temporary impacts associated with construction access, staging, and water diversion will be restored once construction is complete.

The proposed culvert rehabilitation treatments will not signficantly alter stream flow or water levels within the stream channels or adjacent wetlands. The wetland complexes at each Location will continue to provide functions and values at levels similar to pre-construction conditions.

Temporary disturbance to wildlife and aquatic habitat may occur during construction as a result of clearing vegetation, diverting the stream, and operating construction equipment.

No changes in the wetland complexes' ability to provide sediment retention and stabilization are anticipated, except for the removal of vegetation for construction access and staging. No significant disturbance to wetland plant root systems is anticipated. Wetland vegetation will be allowed to re-establish naturally.

18. The impact upon the value of the sites included in the latest published edition of the National Register of Natural Landmarks, or sites eligible for such publication.

N/A - No such sites are located near the project.

19. The impact upon the value of areas named in acts of congress or presidential proclamations as national rivers, national wilderness areas, national lakeshores, and such areas as may be established under federal, state, or municipal laws for similar and related purposes such as estuarine and marine sanctuaries.

N/A - No such areas are located near the project.

20. The degree to which a project redirects water from one watershed to another.

The project will not make any changes that would redirect water from one watershed to another.

Additional comments

DRAFT

BUREAU OF ENVIRONMENT
CONFERENCE REPORT

SUBJECT: NHDOT Monthly Natural Resource Agency Coordination Meeting
DATE OF CONFERENCE: December 19, 2018
LOCATION OF CONFERENCE: John O. Morton Building
ATTENDED BY:

NHDOT
Matt Urban
Ron Crickard
Doug Locker
Tim Boodey
Chris Carucci
Rebecca Martin
Julius Nemeth

ACOE
Mike Hicks

NHDES
Gino Infascelli
Lori Sommer

(When viewing these minutes online, click on an attendee to send an e-mail)

PRESENTATIONS/ PROJECTS REVIEWED THIS MONTH: *(minutes on subsequent pages)*

(When viewing these minutes online, click on a project to zoom to the minutes for that project)

Lori Sommer mentioned mitigation would not being required as a result of riprap already present and being within 10' of the structure. G. Infascelli added that the work is also needed to protect the existing infrastructure.

This project was previously discussed at the 11/21/2018 Monthly Natural Resource Agency Coordination Meeting.

Bow, #42300

- Christopher Carucci and Matt Urban presented the project.
- The project is Turnpikes Funded (non-fed.)
- Ad-Date May 2019
- Project is located south of the I-89 interchange on I-93 North and Southbound in the Town of Bow.
- The structure is located on a Tier 2 Stream, perennial, with no history of flooding.
- Streamstats drainage area is 0.58 square miles (375 acres).The structure consists of a 48"RCP at the inlet which transitions to a junction box under the interstate, and then transitions again to a 48"CMP. There are stone headwalls on the 48" rcp inlet and 48" cmp outlet.
- The segment of 48" rcp was constructed in 1957 and is approximately 180' long at 9% slope.
- The segment of 48" cmp was constructed in 1977 and is approximately 144' long at 15% slope.
- A portion of I-93 closed drainage was connected to the junction box with a 15" metal pipe which has failed.
- Turnpikes forces plugged the 15" cmp and installed a short segment of 18" slope drain to provide an outlet for the closed drainage.
- The 48" CMP at the outlet is the section of pipe that is rusted and in need of rehabilitation.
- The Inlet header is also in need of rehabilitation.
- The outlet is perched approximately 12"
- Matt Urban summarized the following environmental information:
    - The stream has been delineated as perennial.
    - Regional curve estimates the bank full width at 9.6'
    - Stream is considered a Tier 2 Stream
    - Anticipate Env-Wt904.06 (consistent with proposed sliplining).
    - Anticipate Temp impacts only to facilitate lining and headwall repairs.
    - Anticipate No need for Mitigation.
    - Cultural Review was completed with no above or below ground concerns. Also that this work falls under the Section 106 Exemption regarding effects to the interstate Highway System.
    - NHB search (NHB18-3420) indicated no concerns for the project
    - IPAC- identified NLEB and Small Whorled Pogonia (SWP). Matt Indicated that during field reviews the SWP was not found, habitat thought not to be suitable. As for NLEB Matt indicated there would be some clearing but that the Department has submitted the 4(d) consultation to the USFWS.
    - Additional coordination with NHF&G was completed to discuss the steep slope of the pipes and the existing perch. John Magee ran the Coffman thesis analysis and was able to determine that it was unlikely that any fish passage would be occurring at this location with the exception of a very diligent adult brook trout as a possibility.
    - Not within shoreland jurisdiction, however project is located within ¼ mile of the Merrimack River and therefore the Merrimack Local River Advisory Committee will be notified upon submission of the wetlands application.

- Chris indicated that the proposed work consisted of installing a 42" polymer coated corrugated metal liner within the existing 48"CMP.
- Existing stone channel protection at the outlet will be reset to match the new outlet invert.
- Existing and proposed structure will pass the Streamstats Q100.
- Temporary impacts at inlet and outlet are to accommodate the work/water diversion required.
    - Anticipate approximately800 SF at the inlet and 300 SF at the outlet.
    - No permanent impacts proposed.
- Incidental work includes repairs to stone inlet and outlet headwalls, extending the 18" slope drain, and replacing a 15" pipe under the I-89 off ramp with an 18" pipe so that the closed drainage system flows to the new slope drain outlet.
- Lori inquired if the proposed work would be impacted by the Bow-Concord project. Chris indicated no and showed the approximate limits of Bow-Concord work in relation to this work.
- Matt asked for concurrence that no mitigation would be needed since the impacts were going to be all temporary. Lori agreed.
- Chris indicated that the Department was hopeful to submit an application within the next couple of weeks.

This project has not been previously discussed at the Monthly Natural Resource Agency Coordination Meeting.

Stratford, #41788

Rebecca Martin provided a brief overview of the proposed project and described the existing crossing. The Nature Conservancy (TNC) partnered with District 1 to secure a grant through the National Fish and Wildlife Foundation – New England Forests and Rivers Fund. The funds come from US Fish and Wildlife Service. R. Martin explained that the existing box culvert is 4 feet wide and 4.2 feet high and has a slope of approximately 19%. The outlet of the structure is perched more than 4 feet. The proposed structure would be 7 feet wide and 5 feet high. The new structure would include streambed simulation and would have a slope of around 6%.

Matt Urban explained that although the project will have permanent impacts on the stream, the project team believes the project to be self-mitigating. M. Urban commented that the project has been discussed at the November NRAC Meeting and was being discussed at this meeting to determine appropriate mitigation. M. Urban shared that at Gino Infascelli' s recommendation, the designer, Jim McMahon from District 1 has adjusted the design from one feet of embedment to two feet of embedment and no baffles.

The group discussed that fish cannot pass upstream through the structure due to the perch. Comments were made about the wide variety of wildlife currently using the perched structure. The group also discussed that the project would be monitored after construction to ensure the design is working as intended.

M. Urban reminded the group that downstream of the outlet a natural gas pipeline was installed. It appears that when it was installed the pipeline disturbed the channel of the stream. As a result of the pipeline installation, the ditch line/branch adjacent to the roadway appears to have been disconnected/disrupted. As part of the project, District 1 is proposing to reconnect the channel adjacent to the roadway.

Lori Sommer inquired about access to the project area. M. Urban commented that the gas pipeline work had utilized an area just south of the culvert to access the outlet area, so without checking with District 1, he assumed this area would be used once again for this project.

CULVERT REHABILITATION

I-93 / I-89 OFF RAMP FROM I-93 NB

BOW, NH

NHDOT PROJECT NO. 42300

MITIGATION

There are no Permanent impacts proposed. Temporary wetland impacts will be 932 SF, including 443 SF of impact to channels and 489 SF of impacts to banks.

Project mitigation was discussed with NHDES at the December 19, 2018 Natural Resource Agency Coordination Meeting and no mitigation will be required. This project will follow the current BMP standards to protect the existing streams from any infiltration of silt and sands from the construction process. All related construction activities that disturb the existing streams will be done during low flow periods.

42300 BOW
EXHIBIT 1
WATERSHED BOUNDARY
Scale 1" = 1200 FT

NH Department of Transportation
Bureau of Highway Design
Project 42300
Existing 48" cmp
Watershed Area 375 acres, Tier 2

Env-Wt 904.06 Repair or Rehabilitation of Tier 1 or Tier 2 Existing Legal Crossings

- In order to qualify under this section, the crossing cannot have a history of causing or contributing to flooding that damages the crossing or other infrastructure. Does the crossing have a history of flooding? No

- Repair or rehabilitation pursuant to this section may be accomplished by concrete repair, slip lining, cured-in-place lining, or concrete invert lining. Please describe how this applies to the subject project.
  This culvert will be rehabilitated by slip lining

  See the Supplemental Narrative for detailed hydraulic analysis.

If the above criteria do not apply to this project, the crossing does not qualify under this section and must be designed according to 904.02 (Tier 1 crossings) or 904.05 (Tier 2 crossings).

If the above criteria apply to this project, please provide the following information.

The project may qualify as a **minimum** impact project if:
The crossing does not diminish the hydraulic capacity of the crossing.
The proposed rehabilitation will not change the capacity of the crossing.

The crossing does not diminish the capacity of the crossing to accommodate aquatic life passage.
The corrugated metal liner will not diminish the crossings ability to accommodate aquatic life passage. It should be noted that the Department has coordinated with NH Fish and Game to discuss fish passage through the existing and proposed structures. NH F&G (John Magee) used information provided by the Department relative to pipe slope, length, and materials to run the Coffman thesis analysis. It was determined that the existing structure was impassible to most all fish species and that it would likely even be very difficult for any adult trout to pass through the existing structure.
Existing stone will be reset to match the new invert elevation at the culvert outlet, improving the capacity to accommodate the passage of aquatic life.

The crossing meets the general design criteria specified in Env-Wt 904.01, as follows:

Env-Wt 904.01
(a) Not be a barrier to sediment transport;
The proposed rehabilitation will not reduce the culvert's ability to transport sediment.

(b) Prevent the restriction of high flows and maintain existing low flows;
The proposed rehabilitation will not change high flow or low flow conditions.

(c) Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction;
The proposed rehabilitation will not obstruct or otherwise disrupt the movement of aquatic life beyond its existing limitations or beyond the actual duration of construction.

(d) Not cause an increase in the frequency of flooding or overtopping of banks;

The proposed rehabilitation will have no effect on the capacity of the crossing. Headwater elevation and extent of ponding will be unchanged.

(e) Preserve watercourse connectivity where it currently exists;
The proposed rehabilitation will not alter connectivity upstream of the outlet.

(f) Restore watercourse connectivity where: (1) Connectivity previously was disrupted as a result of human activity(ies); and (2) Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both;
The proposed rehabilitation will restore the connectivity at the outlet by alleviating the outlet perch. However, due to the slope and length of the structure it will remain impassible based on the analysis conducted by NHF&G.

(g) Not cause erosion, aggradation, or scouring upstream or downstream of the crossing; and
Outlet velocity increase due to the smaller diameter liner is estimated at 0.5 ft/s. Existing stone armor is sufficient to prevent erosion. There will be no change to the upstream conditions.

(h) Not cause water quality degradation.
The proposed rehabilitation will not have a permanent effect on water quality. Erosion control best management practices will be used to prevent degradation to water quality during construction.

If the project does not qualify as a minimum impact project due to reasons stated above, it may qualify as a **minor** impact project if:

The crossing does not adversely impact the stability of the stream banks or stream bed upstream or downstream of the crossing.
The existing stream channels are stable and heavily armored with stone. Outlet velocity increase due to the smaller diameter liner is estimated at 0.5 ft/s. Existing stone armor is sufficient to prevent erosion. There will be no change to the upstream conditions.

The crossing does not cause an increase in the frequency of flooding or overtopping of banks.
The proposed rehabilitation will have no effect on the capacity of the crossing. Headwater elevation and extent of ponding will be unchanged.

If the project does not meet the above criteria for minimum OR minor, the crossing does not qualify under this section and must be designed according to 904.02 (Tier 1 crossings) or 904.05 (Tier 2 crossings).

NEW HAMPSHIRE NATURAL HERITAGE BUREAU
NHB DATACHECK RESULTS LETTER

To: Matt Urban, NH Department of Transportation
7 Hazen Dr.
Concord , NH 03301

From: NH Natural Heritage Bureau

Date: 11/5/2018 (valid for one year from this date)

Re: Review by NH Natural Heritage Bureau of request submitted 11/5/2018

NHB File ID: NHB18-3420 **Applicant:** NHDOT

Location: Bow
I-93 North and Southbound & I-89 Nothbound On-Ramp.

Project Description: Rehabilitate 48" CMP via sliplining with a 42" polymer coated corrugated metal liner.

The NH Natural Heritage database has been checked by staff of the NH Natural Heritage Bureau and/or the NH Nongame and Endangered Species Program for records of rare species and exemplary natural communities near the area mapped below. The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government.

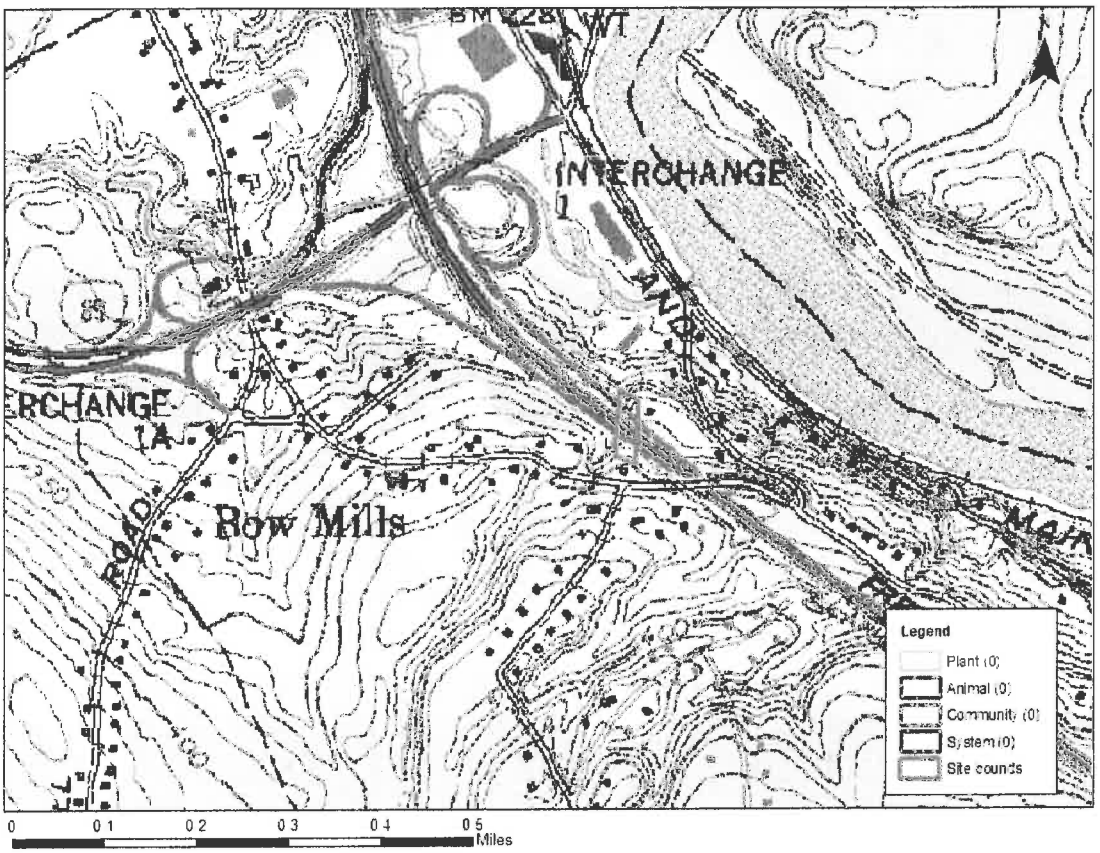
It was determined that, although there was a NHB record (e.g., rare wildlife, plant, and/or natural community) present in the vicinity, we do not expect that it will be impacted by the proposed project. This determination was made based on the project information submitted via the NHB Datacheck Tool on 11/5/2018, and cannot be used for any other project.

Department of Natural and Cultural Resources
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DNCR/NHB
172 Pembroke Rd.
Concord, NH 03301

MAP OF PROJECT BOUNDARIES FOR: **NHB18-3420**

NHB18-3420



Department of Natural and Cultural Resources
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DNCR/NHB
172 Pembroke Rd.
Concord, NH 03301

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
http://www.fws.gov/newengland

In Reply Refer To:
Consultation Code: 05E1NE00-2019-SLI-0291
Event Code: 05E1NE00-2019-E-00648
Project Name: Bow 42300

November 08, 2018

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

Project Summary

Consultation Code: 05E1NE00-2019-SLI-0291

Event Code: 05E1NE00-2019-E-00648

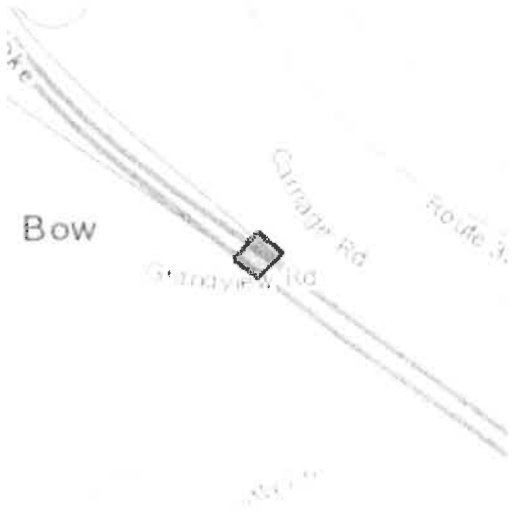
Project Name: Bow 42300

Project Type: TRANSPORTATION

Project Description: Slipline a failing 48" pipe

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/43.166310131937735N71.52469572041696W



Counties: Merrimack, NH

Endangered Species Act Species

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Flowering Plants

NAME	STATUS
Small Whorled Pogonia *Isotria medeoloides* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1890	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION

Urban, Matt

From: Magee, John
Sent: Wednesday, October 10, 2018 12:37 PM
To: Urban, Matt
Subject: RE: Bow 42300, I-89 off ramp Culvert Rehab

No, different location. We have no fish data for that stream, so I can't say what fish species are in there. However, it's possible there are wild brook trout because our fish survey database does show a bunch of streams that flow into the Merrimack River from the west have wild brook trout from Concord down to Merrimack. Interestingly, there are few wild brook trout streams on the other side of the Merrimack River.

John Magee
M.S., Certified Fisheries Professional
Fish Habitat Biologist
New Hampshire Fish and Game Department
11 Hazen Drive
Concord, NH 03301
P 603-271-2744
F 603-271-5829

"NH Fish and Game Department: Connecting you to life outdoors"

Did you know...The NH Fish and Game Department protects, conserves and manages more than 500 species of wildlife, including 63 mammals, 18 reptiles, 22 amphibians, 313 birds, and 122 fish. For more information visit: http://wildlife.state.nh.us/Wildlife/wildlife_plan.htm

From: Urban, Matt
Sent: Wednesday, October 10, 2018 12:32 PM
To: Magee, John
Subject: RE: Bow 42300, I-89 off ramp Culvert Rehab

Ha! No worries, does that location on the map look like the location you did see the hatchery trout upstream? Also, thank you for taking the time to respond so quickly.
Matt

From: Magee, John
Sent: Wednesday, October 10, 2018 12:30 PM
To: Urban, Matt
Subject: RE: Bow 42300, I-89 off ramp Culvert Rehab

And after I press send, I realize you sent a map!

John Magee
M.S., Certified Fisheries Professional
Fish Habitat Biologist
New Hampshire Fish and Game Department

11 Hazen Drive
Concord, NH 03301
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From: Urban, Matt
Sent: Wednesday, October 10, 2018 6:41 AM
To: Magee, John
Subject: FW: Bow 42300, I-89 off ramp Culvert Rehab

Hi John,

We are looking for your opinion on a structure that we think is likely impassable but we would like to get your opinion based on the length and slope of the pipe.

Chris Carucci our hydraulic engineer has described the pipe below. This 48" pipe was essentially constructed in two halves one half is concrete pipe at 9% slope and 180 LF it is joined with a junction box to a metal pipe at 15% slope and 144 LF. There is also a 12" perch at the outlet.

Because of the depth that we are working with under I-93/I-89 on ramp, and the traffic control concerns, we are looking at proposing some type of cured in place liner.

We would like your opinion as to whether or not you think fish are currently getting through this pipe.

Thanks for any insight you may have,
Matt

From: Carucci, Christopher
Sent: Tuesday, October 9, 2018 4:04 PM
To: Urban, Matt
Subject: Bow 42300, I-89 off ramp Culvert Rehab

As discussed, this is a Tier 2 stream crossing. Archive plan attached showing the 48" cmp that needs rehab.
Upstream 48" rcp is 180 LF at 9%. Junction box is about 23' deep. 48" cmp is 144 LF at 15%. Outlet is perched about 12".
One option being considered is cured in place lining, which would result in a smoother interior and increased velocity.
If aquatic organism passage is a concern, this treatment will not be considered.
Other options are concrete invert repair and slip lining with a 42" corrugated metal pipe.
Opinion from Fish& Game would be appreciated.

Proposed State Projects – NHDOT Cultural Resources Review

For the purpose of compliance with regulations of the National Historic Preservation Act, the Advisory Council on Historic Preservation's *Procedures for the Protection of Historic Properties* (36 CFR 800), the US Army Corps of Engineers' *Appendix C*, and/or state regulation RSA 227-C:9, *Directive for Cooperation in the Protection of Historic Resources*, the NHDOT Cultural Resources Program has reviewed the proposed project for potential impacts to historic properties and resources.

Proposed project: NO federal funding, Turnpikes TRR funded, Ad Date Sprint 2019

The proposed action consists of rehabilitating a pipe that is located under the I-93 Northbound and Southbound barrels as well as the I-89 Northbound on ramp, located in the Town of Bow. The structure is located on a tier 2 stream and consists of a 48" Reinforced Concrete Pipe (RCP) starting on the inlet side that is 180' long at 9% grade that meets up with a junction box 23' below the Interstate. From the junction box the pipe transitions to a 48" Corrugated Metal Pipe (CMP) that is 144' long at a 15% slope. The outlet is currently perched approximately 12" and the CMP invert is rusted out. The proposed work consists of installing a 42" polymer coated corrugated metal liner the entire length of the . Note: Impacts will be limited to the inlet and outlet of the pipe as to facilitate the proposed slip lining.

Above Ground Review

Known/approximate age of structure:
n/a

☒ No Potential to Cause Effect/No Concerns
See below

☐ Concerns:

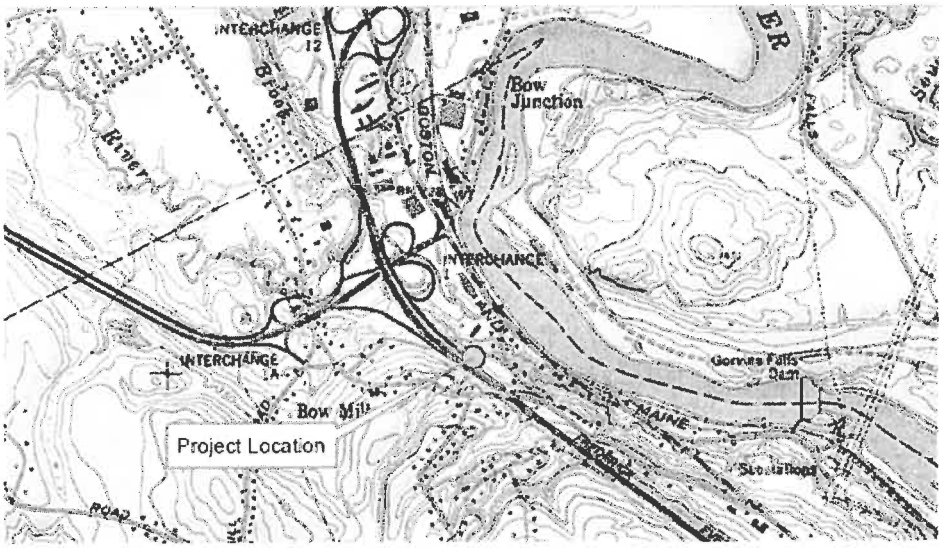
Below Ground Review

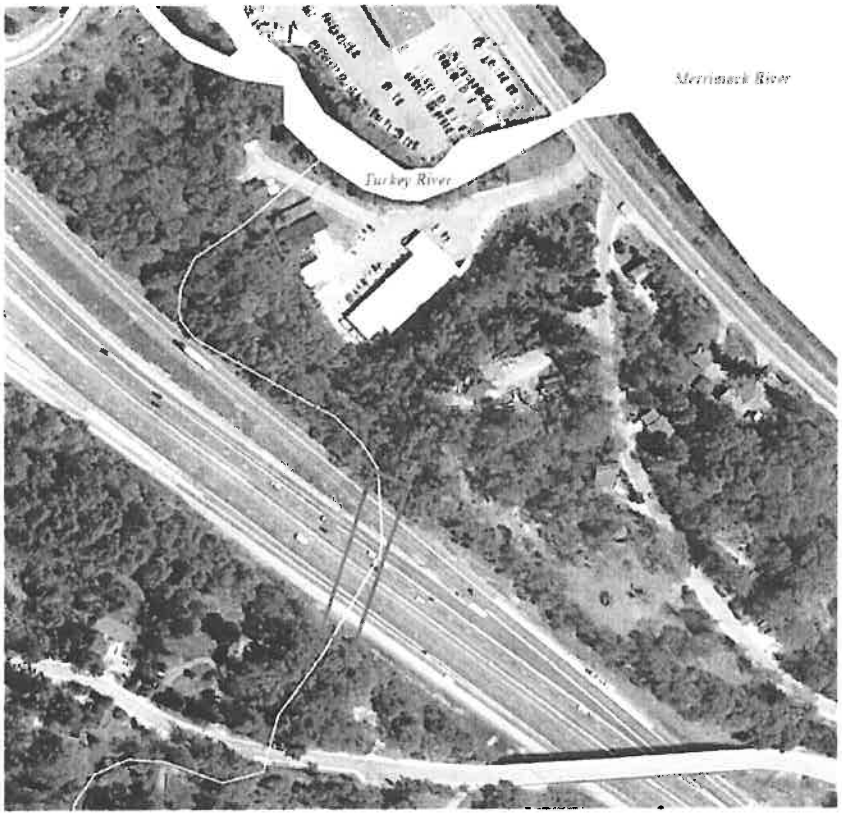
Recorded Archaeological site: ☐Yes ☒No

Nearest Recorded Archaeological Site Name & Number: 27-MR-0078
☒Pre-Contact ☐Post-Contact

Distance from Project Area:
4818 ft (1.47 km) east of project area

☒ No Potential to Cause Effect/No Concerns
Due to the proposed undertakings, there are no cultural resources concerns.
Furthermore, the location under I-93 and I-89 is part of the Interstate and falls under the Section 106 Exemption regarding effects to the Interstate Highway System (2005).


INTERCHANGE 12
Bow Junction
INTERCHANGE
INTERCHANGE
Bow Mill
Project Location
MAINE
ROAD


Merrimack River
Turkey River

☐ Concerns:

Summary review results: The project scope was reviewed by Cultural Resources Program Specialist/Archaeologist Sheila Charles. Due to the proposed undertakings, there are no cultural resources concerns. **Furthermore, the location under I-93 and I-89 is part of the Interstate and falls under the Section 106 Exemption regarding effects to the Interstate Highway System (2005).**

If the scope of work changes or the Contractor proposes work in previously undisturbed areas, the Bureau of Environment will review the changes and reassess the findings prior to construction.

Reviewed by:

Sheila Charles

NHDOT Cultural Resources Staff

11/19/2018

Date:

US Army Corps of Engineers ®
New England District

New Hampshire General Permits (GPs)
Appendix B - Corps Secondary Impacts Checklist
(for inland wetland/waterway fill projects in New Hampshire)

1. Attach any explanations to this checklist. Lack of information could delay a Corps permit determination.
2. All references to "work" include all work associated with the project construction and operation. Work includes filling, clearing, flooding, draining, excavation, dozing, stumping, etc.
3. See GC 5, regarding single and complete projects.
4. Contact the Corps at (978) 318-8832 with any questions.

1. Impaired Waters	Yes	No
1.1 Will any work occur within 1 mile upstream in the watershed of an impaired water? See http://des.nh.gov/organization/divisions/water/wmb/section401/impaired_waters.htm to determine if there is an impaired water in the vicinity of your work area.*		X
2. Wetlands	Yes	No
2.1 Are there are streams, brooks, rivers, ponds, or lakes within 200 feet of any proposed work?	X	
2.2 Are there proposed impacts to SAS, special wetlands. Applicants may obtain information from the NH Department of Resources and Economic Development Natural Heritage Bureau (NHB) DataCheck Tool for information about resources located on the property at https://www2.des.state.nh.us/nhb_datacheck/. The book Natural Community Systems of New Hampshire also contains specific information about the natural communities found in NH.		X
2.3 If wetland crossings are proposed, are they adequately designed to maintain hydrology, sediment transport & wildlife passage?	X	
2.4 Would the project remove part or all of a riparian buffer? (Riparian buffers are lands adjacent to streams where vegetation is strongly influenced by the presence of water. They are often thin lines of vegetation containing native grasses, flowers, shrubs and/or trees that line the stream banks. They are also called vegetated buffer zones.)		X
2.5 The overall project site is more than 40 acres?		X
2.6 What is the area of the previously filled wetlands?	UKN	
2.7 What is the area of the proposed fill in wetlands?	0	
2.8 What is the % of previously and proposed fill in wetlands to the overall project site?	0	
3. Wildlife	Yes	No
3.1 Has the NHB & USFWS determined that there are known occurrences of rare species, exemplary natural communities, Federal and State threatened and endangered species and habitat, in the vicinity of the proposed project? (All projects require an NHB ID number & a USFWS IPAC determination.) NHB DataCheck Tool: https://www2.des.state.nh.us/nhb_datacheck/ USFWS IPAC website: https://ecos.fws.gov/ipac/location/index		X

3.2 Would work occur in any area identified as either "Highest Ranked Habitat in N.H." or "Highest Ranked Habitat in Ecological Region"? (These areas are colored magenta and green, respectively, on NH Fish and Game's map, "2010 Highest Ranked Wildlife Habitat by Ecological Condition.") Map information can be found at: • PDF: www.wildlife.state.nh.us/Wildlife/Wildlife_Plan/highest_ranking_habitat.htm. • Data Mapper: www.granit.unh.edu. • GIS: www.granit.unh.edu/data/downloadfreedata/category/databycategory.html.		X
3.3 Would the project impact more than 20 acres of an undeveloped land block (upland, wetland/waterway) on the entire project site and/or on an adjoining property(s)?		X
3.4 Does the project propose more than a 10-lot residential subdivision, or a commercial or industrial development?		X
3.5 Are stream crossings designed in accordance with the GC 21?	X	
4. Flooding/Floodplain Values	Yes	No
4.1 Is the proposed project within the 100-year floodplain of an adjacent river or stream?		X
4.2 If 4.1 is yes, will compensatory flood storage be provided if the project results in a loss of flood storage?		N/A
5. Historic/Archaeological Resources		
For a minimum, minor or major impact project - a copy of the Request for Project Review (RPR) Form (www.nh.gov/nhdhr/review) with your DES file number shall be sent to the NH Division of Historical Resources as required on Page 11 GC 8(d) of the GP document**		N/A

*Although this checklist utilizes state information, its submittal to the Corps is a Federal requirement.
** If your project is not within Federal jurisdiction, coordination with NH DHR is not required under Federal law.

Photos by NHDOT Highway Design 9/6/2018, 12/26/2018
and NHDOT Bureau of Environment 10/17/2018, 10/22/2018

48" RCP Inlet, Wetland #1, Impact Area A 10/17/2018

12/26/2018

48" RCP inlet channel
Wetland #1, B, B1, Impact Area A

9/6/2018

48" RCP inlet channel, looking upstream
Wetland #1, B, B1, Impact Area A

9/6/2018

48" CMP outlet
Wetland #2, B2, B3, Impact Area B

10/22/2018

48" CMP outlet channel
Wetland #2, B2, B3, Impact Area B

12/26/2018

48" CMP outlet channel
Wetland #2, B2, B3, Impact Area B

Bow 42300

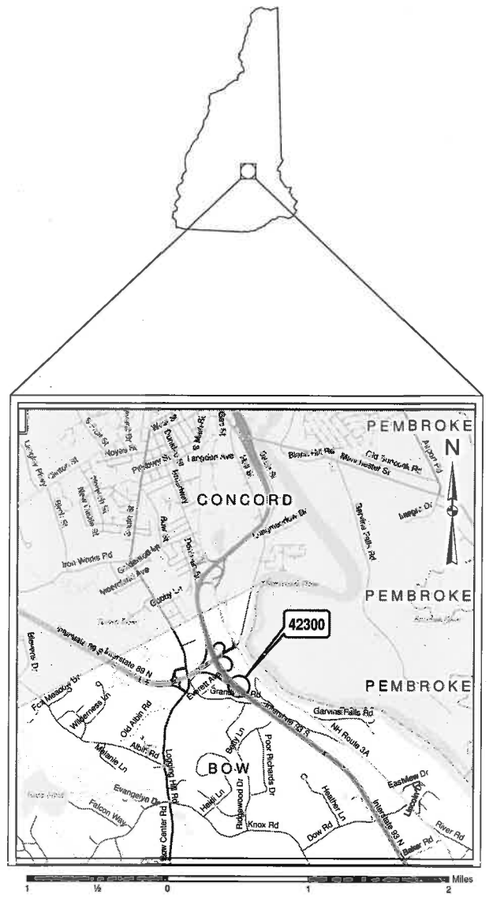
CONSTRUCTION SEQUENCE

1. Install perimeter controls.
2. Clear trees and brush at outlet as needed for access.
3. Install water diversion at 48" rcp inlet and other sedimentation controls/BMP's as needed.
4. Clean water shall be pumped to the closest I-93 ditch line catch basin unless otherwise approved as part of the Contractor's Erosion Control Plan.
5. Clean and inspect 48" cmp culvert.
6. Fill voids outside of pipe and areas of missing invert with grout.
7. Remove 30 degree bend and a portion of pipe at the outlet. Do not disturb existing stone outlet headwall. Stockpile excavated material on site.
8. Insert metal liner into remaining portions of existing culvert.
9. Connect lined sections of pipe with direct bury pipe, including a new 30 degree bend.
10. Fill the annular space between the liner and existing culvert with grout.
11. Reset existing stone at outlet.
12. Remove the water diversion structure.
13. Extend 18" plastic slope drain, construct stone apron.
14. Replace 15" rcp under ramp with 18" rcp.
15. Stabilize disturbed areas.
16. Remove erosion control measures.

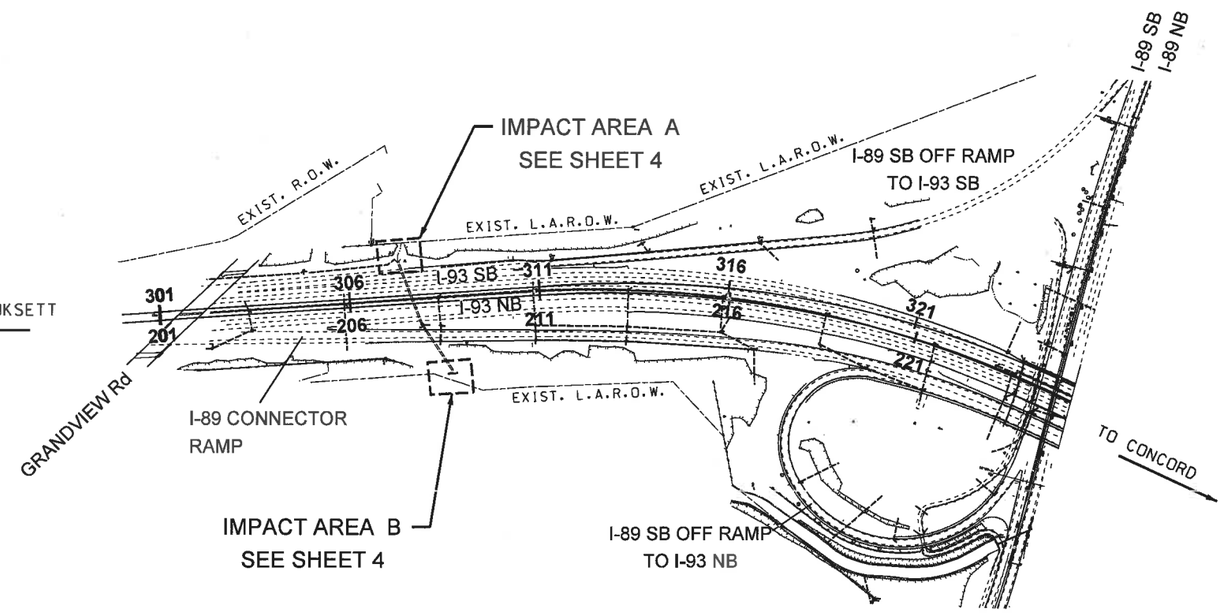
STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION

WETLANDS PLANS
TURNPIKE PROJECT

FEDERAL NO. N/A
N.H. PROJECT NO. 42300
I-93 / I-8 RAMP



LOCATION MAP



INDEX OF SHEETS

DRAWN BY JJN DATE 12/2018
CHECKED BY CAC DATE 12/28/18

TOWN OF BOW
COUNTY OF MERRIMACK
SCALE: 1" = 200'

Wetland Delineation by:
NHDOT, Matt Urban & Sarah Large
on 10/17/2018 and 10/22/2018

DATE: 1/10/2019

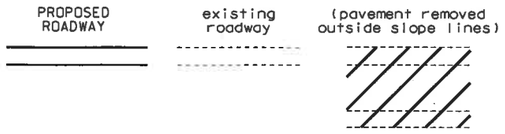
NHDOT THE STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION

I-93 / I-89 RAMP
CULVERT REHABILITATION
WETLAND IMPACT PLANS

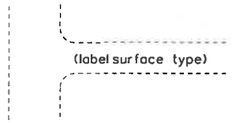
FEDERAL PROJECT NO.	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
N/A	42300	1	7

GENERAL

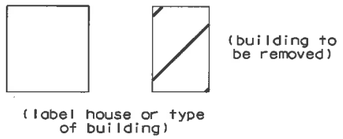
EDGE OF PAVEMENT
TRAVELED WAY



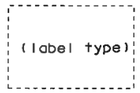
DRIVEWAYS



BUILDINGS

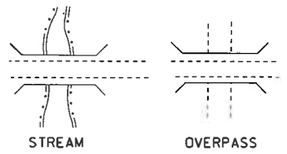


FOUNDATION



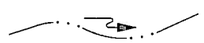
LEACH FIELD

BRIDGE CROSSINGS

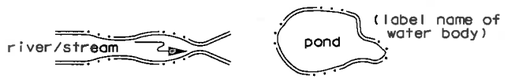


STEPS AND WALK

INTERMITTENT WATER COURSE

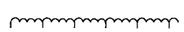


SHORE LINE



POTENTIAL WET AREA SYMBOL

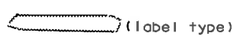
BRUSH OR WOODS LINE



TREES (PLANS)

TREE OR STUMP (CROSS-SECTIONS)

HEDGE

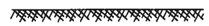


MONITORING WELL

WELL

FLAG POLE

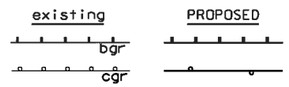
ORIGINAL GROUND (TYPICALS)



ROCK OUTCROP

ROCK LINE (TYPICALS & SECTIONS ONLY)

GUARDRAIL (label type)



JERSEY BARRIER

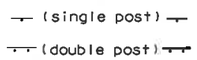
CURB (LABEL TYPE)

STONE WALL

RETAINING WALL (LABEL TYPE)

FENCE (LABEL TYPE)

SIGNS



GAS PUMP

FUEL TANK (ABOVE GROUND)

STORAGE TANK FILLER CAP

SEPTIC TANK

GRAVE

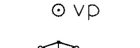
MAILBOX

VENT PIPE

SATELLITE DISH ANTENNA

PHONE

GROUND LIGHT/LAMP POST



BORING LOCATION

TEST PIT

INTERSTATE NUMBERED HIGHWAY

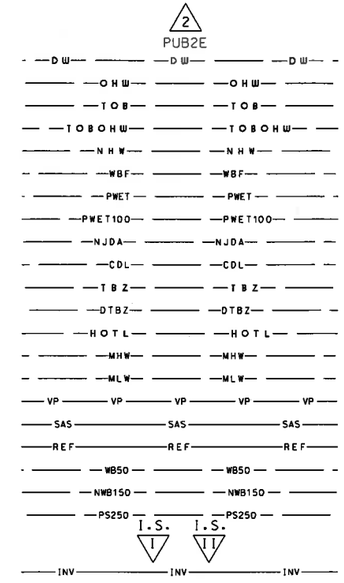
UNITED STATES NUMBERED HIGHWAY

STATE NUMBERED HIGHWAY

SHORELAND - WETLAND

WETLAND DESIGNATION AND TYPE

DELINEATED WETLAND
ORDINARY HIGH WATER
TOP OF BANK
TOP OF BANK & ORDINARY HIGH WATER
NORMAL HIGH WATER
WIDTH AT BANK FULL
PRIME WETLAND
PRIME WETLAND 100' BUFFER
NON-JURISDICTIONAL DRAINAGE AREA
COWARDIN DISTINCTION LINE
TIDAL BUFFER ZONE
DEVELOPED TIDAL BUFFER ZONE
HIGHEST OBSERVABLE TIDE LINE
MEAN HIGH WATER
MEAN LOW WATER
VERNAL POOL
SPECIAL AQUATIC SITE
REFERENCE LINE
WATER FRONT BUFFER
NATURAL WOODLAND BUFFER
PROTECTED SHORELAND

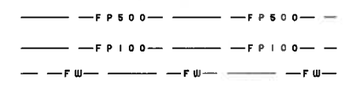


INVASIVE SPECIES LABEL

INVASIVE SPECIES

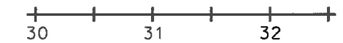
FLOODPLAIN / FLOODWAY

500 YEAR FLOODPLAIN BOUNDARY
100 YEAR FLOODPLAIN BOUNDARY
FLOODWAY



ENGINEERING

CONSTRUCTION BASELINE



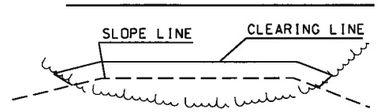
PC. PT. POT (ON CONST BASELINE)

PI (IN CONSTRUCTION BASELINES)

INTERSECTION OR EQUATION OF TWO LINES

ORIGINAL GROUND LINE (PROFILES AND CROSS-SECTIONS)

PROFILE GRADE LINE (PROFILES AND CROSS-SECTIONS)



CLEARING LINE
SLOPE LINE
SLOPE LINE (FILL)

SLOPE LINE (CUT)

PROFILES AND CROSS SECTIONS:
ORIGINAL GROUND ELEVATION (LEFT)
FINISHED GRADE ELEVATION (RIGHT)

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

STANDARD SYMBOLS

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
11-21-2014	42300stdsymb1_2	42300	2	7

DRAINAGE

MANHOLE

CATCH BASIN — cb — (existing) — (PROPOSED)

DROP INLET — di

DRAINAGE PIPE (existing) — (label size & type)

DRAINAGE PIPE (PROPOSED)

UNDERDRAIN (existing) W/ FLUSHING BASIN — fb — (label size & type)

UNDERDRAIN (PROPOSED) W/ FLUSHING BASIN — show direction of flow

HEADER (existing & PROPOSED) — (with stone outlet protection)

END SECTION (existing & PROPOSED) — METAL or PLASTIC — RCP

OPEN DITCH (PROPOSED)

EROSION CONTROL/ STONE SLOPE PROTECTION

BOUNDARIES / RIGHT-OF-WAY

RIGHT-OF-WAY LINE — (label type)

RR RIGHT-OF-WAY LINE

PROPERTY LINE

PROPERTY LINE (COMMON OWNER) — Z

TOWN LINE — BOW / CONCORD

COUNTY LINE — COOS / GRAFTON

STATE LINE — MAINE / NEW HAMPSHIRE

NATIONAL FOREST

CONSERVATION LAND — LC

BENCH MARK / SURVEY DISK

BOUND — bnd — (PROPOSED)

STATE LINE/ TOWN LINE MONUMENT — S/L — T/L

NHDOT PROJECT MARKER

IRON PIPE OR PIN — ip

DRILL HOLE IN ROCK — dh

TAX MAP AND LOT NUMBER — 156 / 14 — 1642/341 — 6.80 Ac.±

PROPERTY PARCEL NUMBER — 12

HISTORIC PROPERTY — H

UTILITIES

existing — PROPOSED

TELEPHONE POLE

POWER POLE

JOINT OCCUPANCY

MISCELLANEOUS/UNKNOWN POLE

GUY POLE OR PUSH BRACE

(plot point at face not center of symbol)

LIGHT POLE

LIGHT ON POWER POLE

LIGHT ON JOINT POLE

POLE STATUS: REMOVE, LEAVE, PROPOSED, OR TEMPORARY AS APPLICABLE e.g.: R, L, P+04 25.0', T+04 25.0'

RAILROAD — (label ownership)

RAILROAD SIGN

RAILROAD SIGNAL

UTILITY JUNCTION BOX — jb — JB

OVERHEAD WIRE — OW — (label type)

UNDERGROUND UTILITIES

WATER (on existing lines label size, type and note if abandoned) — W — PW

SEWER — S — PS

TELEPHONE — T — PT

ELECTRIC — E — PE

GAS — G — PG

LIGHTING — L — PL

INTELLIGENT TRANSPORTATION SYSTEM — ITS

FIBER OPTIC — FO — PFO

WATER SHUT OFF

GAS SHUT OFF

HYDRANT

MANHOLES

SEWER — MHS

TELEPHONE — MHT

ELECTRICAL — MHE

GAS — MHG

UNKNOWN

TRAFFIC SIGNALS / ITS

existing — PROPOSED

MAST ARM (existing) — 30' MA (NOTE ANGLE FROM ℄)

OPTICOM RECEIVER

OPTICOM STROBE

TRAFFIC SIGNAL

PEDESTAL WITH PEDESTRIAN SIGNAL HEADS AND PUSH BUTTON UNIT

SIGNAL CONDUIT — C — PC

CONTROLLER CABINET — cc — CC

METER PEDESTAL — mp — MP

PULL BOX — pb — PB

LOOP DETECTOR (QUADRUPOLE) — (label size)

LOOP DETECTOR (RECTANGULAR) — (label size)

CAMERA POLE (CCTV)

FIBER OPTIC DELINEATOR — fod — FOD

FIBER OPTIC SPLICE VAULT — SVF

ITS EQUIPMENT CABINET — its — ITS

VARIABLE SPEED LIMIT SIGN

DYNAMIC MESSAGE SIGN

ROAD AND WEATHER INFO SYSTEM

CONSTRUCTION NOTES

CURB MARK NUMBER - BITUMINOUS — B-1

CURB MARK NUMBER - GRANITE — G-1

CLEARING AND GRUBBING AREA — A

DRAINAGE NOTE — 1

EROSION CONTROL NOTE — A

FENCING NOTE — A

GUARDRAIL NOTE — 1

ITS NOTE — 1

LIGHTING NOTE — A

TRAFFIC SIGNAL NOTE — 1

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

STANDARD SYMBOLS

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
9-1-2016	42300stdsymb1_2	42300	3	7

LEGEND

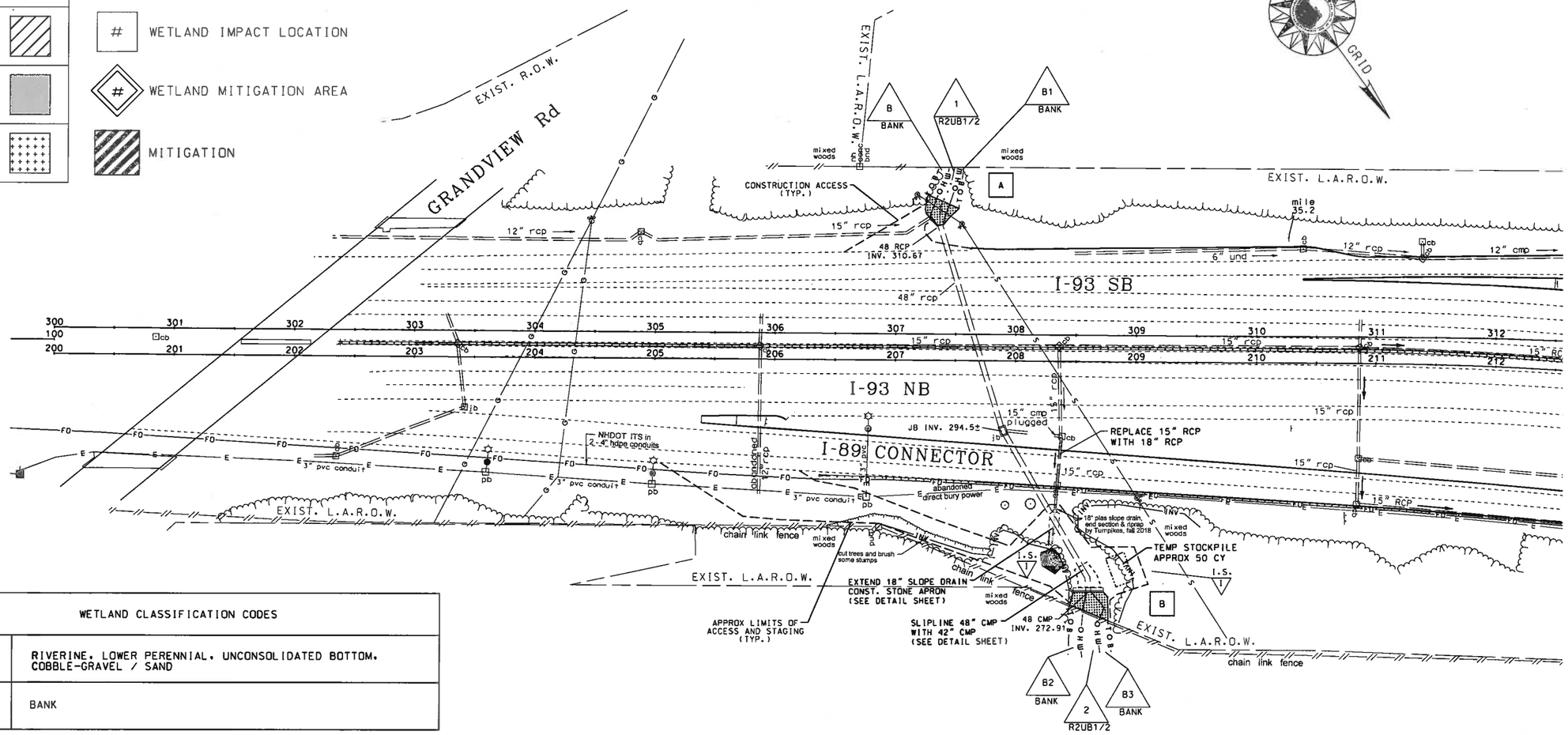
TYPE OF WETLAND IMPACT	SHADING/ HATCHING
NEW HAMPSHIRE WETLANDS BUREAU (PERMANENT NON-WETLAND)	
NEW HAMPSHIRE WETLANDS BUREAU & ARMY CORP OF ENGINEERS (PERMANENT WETLAND)	
TEMPORARY IMPACTS	

(#) WETLAND DESIGNATION NUMBER

WETLAND IMPACT LOCATION

(#) WETLAND MITIGATION AREA

MITIGATION



WETLAND CLASSIFICATION CODES	
R2UB1/2	RIVERINE, LOWER PERENNIAL, UNCONSOLIDATED BOTTOM, COBBLE-GRAVEL / SAND
BANK	BANK

WETLAND IMPACT SUMMARY

WETLAND NUMBER	WETLAND CLASSIFICATION	LOCATION	AREA IMPACTS						LINEAR STREAM IMPACTS FOR MITIGATION		
			PERMANENT				TEMPORARY		PERMANENT		
			N.H.W.B (NON-WETLAND)		N.H.W.B & A.C.O.E. (WETLAND)				BANK LEFT	BANK RIGHT	CHANNEL
			SF	LF	SF	LF	SF	LF	LF	LF	LF
1	R2UB1/2	A					216	20			
B	BANK	A					113	25			
B1	BANK	A					77	18			
2	R2UB1/2	B					227	19			
B2	BANK	B					147	16			
B3	BANK	B					152	26			
SUB-TOTALS			0	0	0	0	932	124	0	0	0

PERMANENT IMPACTS: 0 SF
TEMPORARY IMPACTS: 932 SF
TOTAL IMPACTS: 932 SF

50 0 50 100
SCALE IN FEET

REVISIONS AFTER PROPOSAL

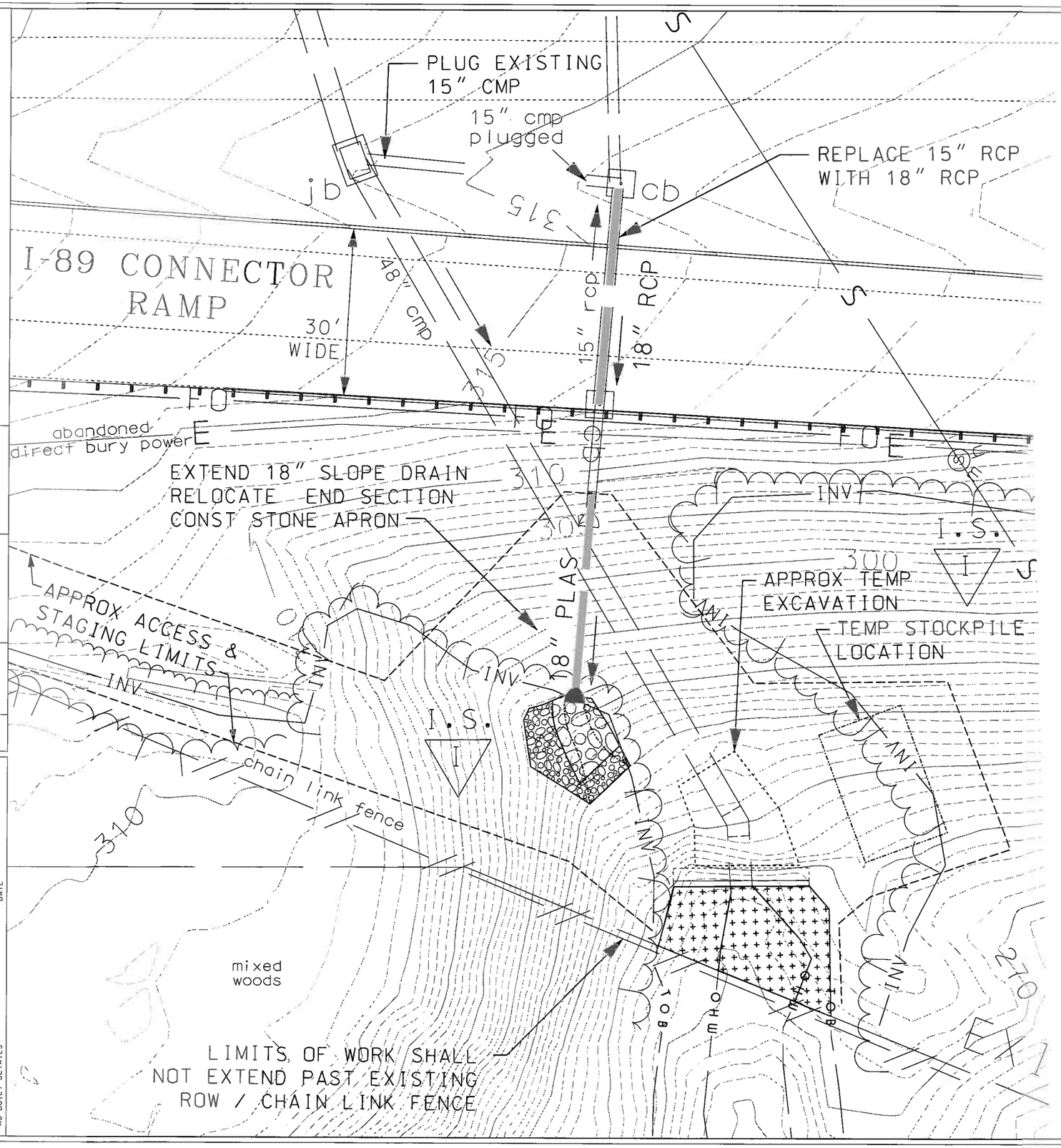
NUMBER	DATE	STATION	DESCRIPTION

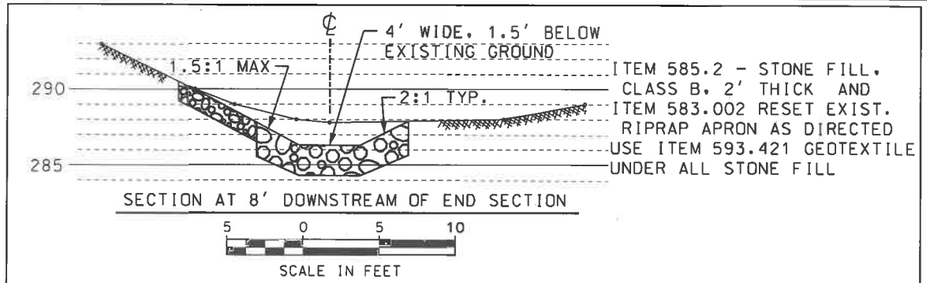
	DATE
SDR PROCESSED	
NEW DESIGN JJN	DATE 12/2018
SHEET CHECKED CAC	DATE 12/28/18
AS BUILT DETAILS	DATE

STATE OF NEW HAMPSHIRE
BOW
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

WETLAND IMPACT PLAN

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
42300wetplan	42300	4	7



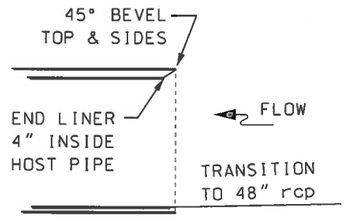


APRON LENGTH 16' MIN FROM END SECTION.
TRANSITION FROM END SECTION TO CROSS SECTION SHOWN ABOVE OVER 8'.
TRANSITION TO 10' WIDE, LEVEL, AT APPROX EL 285, OVER 8'.
USE NEW CLASS B STONE UP TO 1.5' ABOVE FLOWLINE FOR FIRST 12' OF APRON.
USE RESET STONE AS DIRECTED FOR REMAINDER OF APRON.

SLOPE DRAIN STONE APRON

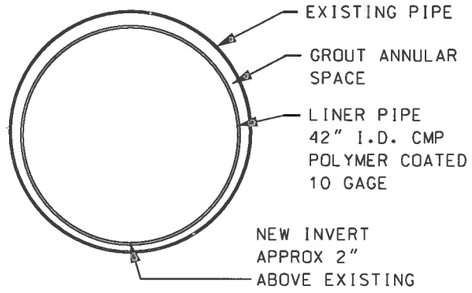
GENERAL NOTES

LINER SEGMENTS SLALL BE 12' OR LESS TO MINIMIZE REQUIRED EXCAVATION.
REMOVE APPROX 20 LF OF 48" CMP AT OUTLET (INCLUDING 30° BEND).
DO NOT DISTURB EXISTING MRM OUTLET HEADER. PORTION OF 48" CMP WITHIN THE MRM HEADER SHALL REMAIN IN PLACE.
SLIPLINE REMAINING PORTIONS OF 48" CMP WITH 42" POLYMER COATED CMP LINER.
CONNECT SLIPLINED SEGMENTS WITH DIRECT BURY 42" POLYMER COATED CMP. INCLUDING A NEW 30° BEND.
CONSTRUCT 45° BEVEL AT INLET SIDE OF LINER (SEE DETAIL BELOW) TO TRANSITION FROM 42" LINER TO 48" DIAMETER AT INSIDE WALL OF JUNCTION BOX (SUBSIDIARY). BEVEL MAY BE CONCRETE OR PREFABRICATED GALVANIZED STEEL.
CONSTRUCT A SMOOTH SHAPED FLOWLINE INSIDE THE JUCNTION BOX TO TRANSITION FROM THE 48" RCP INVERT TO NEW 42" CMP INVERT (SUBSIDIARY).
PLUG EXISTING 15" CMP AT JUNCTION BOX (SUBSIDIARY).
RESET EXISTNG STONES AT OUTLET TO MAKE A SMOOTH TRANSITION FROM THE NEW 42" OUTLET INVERT TO EXISTING STREAM BED.
RE-USE ALL EXCAVATED SOIL AS DIRECTED WITHIN THE EXISTING ROW.



INLET SIDE BEVEL

NOT TO SCALE



Existing 48" cmp

2⅔" X ½" corrugations
Length 144' Slope 15.0%±

NOT TO SCALE

PLAN

10 0 10 20
SCALE IN FEET

CONTOUR INTERVAL 1 FOOT

STATE OF NEW HAMPSHIRE			
DEPARTMENT OF TRANSPORTATION ◦ BUREAU OF HIGHWAY DESIGN			
DETAILS			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
42300det01	42300	5	7

REVISIONS AFTER PROPOSAL

NUMBER	DESCRIPTION	DATE	STATION

SDR PROCESSED	DATE	
NEW DESIGN	JJN	DATE 12/2018
SHEET CHECKED	CAC	DATE 12/28/18
AS BUILT DETAILS		DATE

EROSION CONTROL STRATEGIES

1. ENVIRONMENTAL COMMITMENTS:
   - 1.1. THESE GUIDELINES DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH ANY CONTRACT PROVISIONS, OR APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.
   - 1.2. THIS PROJECT WILL BE SUBJECT TO THE US EPA'S NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORM WATER CONSTRUCTION GENERAL PERMIT AS ADMINISTERED BY THE ENVIRONMENTAL PROTECTION AGENCY (EPA). THIS PROJECT IS SUBJECT TO REQUIREMENTS IN THE MOST RECENT CONSTRUCTION GENERAL PERMIT (CGP).
   - 1.3. THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE NHDES WETLAND PERMIT, THE US ARMY CORPS OF ENGINEERS PERMIT, WATER QUALITY CERTIFICATION AND THE SPECIAL ATTENTION ITEMS INCLUDED IN THE CONTRACT DOCUMENTS.
   - 1.4. ALL STORM WATER, EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE NEW HAMPSHIRE STORMWATER MANUAL, VOLUME 3, EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION (DECEMBER 2008) (BMP MANUAL) AVAILABLE FROM THE NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES (NHDES).
   - 1.5. THE CONTRACTOR SHALL COMPLY WITH RSA 485-A:17, AND ALL, PUBLISHED NHDES ALTERATION OF TERRAIN ENV-WQ 1500 REQUIREMENTS (HTTP://DES.NH.GOV/ORGANIZATION/COMMISSIONER/LEGAL/RULES/INDEX.HTM)
   - 1.6. THE CONTRACTOR IS DIRECTED TO REVIEW AND COMPLY WITH SECTION 107.1 OF THE CONTRACT AS IT REFERS TO SPILLAGE, AND ALSO WITH REGARDS TO EROSION, POLLUTION, AND TURBIDITY PRECAUTIONS.

2. STANDARD EROSION CONTROL SEQUENCING APPLICABLE TO ALL CONSTRUCTION PROJECTS:
   - 2.1. PERIMETER CONTROLS SHALL BE INSTALLED PRIOR TO EARTH DISTURBING ACTIVITIES. PERIMETER CONTROLS AND STABILIZED CONSTRUCTION EXITS SHALL BE INSTALLED AS SHOWN IN THE BMP MANUAL AND AS DIRECTED BY THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) PREPARER.
   - 2.2. EROSION, SEDIMENTATION CONTROL MEASURES AND INFILTRATION BASINS SHALL BE CLEANED, REPLACED AND AUGMENTED AS NECESSARY TO PREVENT SEDIMENTATION BEYOND PROJECT LIMITS THROUGHOUT THE PROJECT DURATION.
   - 2.3. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED IN ACCORDANCE WITH THE CONSTRUCTION GENERAL PERMIT AND SECTION 645 OF THE NHDOT SPECIFICATIONS FOR ROAD AND BRIDGES CONSTRUCTION.
   - 2.4. AN AREA SHALL BE CONSIDERED STABLE IF ONE OF THE FOLLOWING HAS OCCURRED:
     - (A) BASE COURSE GRAVELS HAVE BEEN INSTALLED IN AREAS TO BE PAVED;
     - (B) A MINIMUM OF 85% VEGETATED GROWTH HAS BEEN ESTABLISHED;
     - (C) A MINIMUM OF 3" OF NON-EROSIVE MATERIAL SUCH AS STONE OR RIP-RAP HAS BEEN INSTALLED;
     - (D) TEMPORARY SLOPE STABILIZATION CONFORMING TO TABLE 1 HAS BEEN PROPERLY INSTALLED
   - 2.5. ALL STOCKPILES SHALL BE CONTAINED WITH A PERIMETER CONTROL. IF THE STOCKPILE IS TO REMAIN UNDISTURBED FOR MORE THAN 14 DAYS, MULCHING WILL BE REQUIRED.
   - 2.6. A WATER TRUCK SHALL BE AVAILABLE TO CONTROL EXCESSIVE DUST AT THE DIRECTION OF THE CONTRACT ADMINISTRATOR.
   - 2.7. TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES SHALL REMAIN UNTIL THE AREA HAS BEEN PERMANENTLY STABILIZED.
   - 2.8. CONSTRUCTION PERFORMED ANY TIME BETWEEN NOVEMBER 30" AND MAY 1" OF ANY YEAR SHALL BE CONSIDERED WINTER CONSTRUCTION AND SHALL CONFORM TO THE FOLLOWING REQUIREMENTS.
     - (A) ALL PROPOSED VEGETATED AREAS WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15", OR WHICH ARE DISTURBED AFTER OCTOBER 15", SHALL BE STABILIZED IN ACCORDANCE WITH TABLE 1.
     - (B) ALL DITCHES OR SWALES WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15", OR WHICH ARE DISTURBED AFTER OCTOBER 15", SHALL BE STABILIZED TEMPORARILY WITH STONE OR IN ACCORDANCE WITH TABLE 1.
     - (C) AFTER NOVEMBER 30" INCOMPLETE ROAD SURFACES, WHERE WORK HAS STOPPED FOR THE SEASON, SHALL BE PROTECTED IN ACCORDANCE WITH TABLE 1.
     - (D) WINTER EXCAVATION AND EARTHWORK SHALL BE DONE SUCH THAT NO MORE THAN 1 ACRE OF THE PROJECT IS WITHOUT STABILIZATION AT ONE TIME, UNLESS A WINTER CONSTRUCTION PLAN HAS BEEN APPROVED BY NHDOT THAT MEETS THE REQUIREMENTS OF ENV-WQ 1505.02 AND ENV-WQ 1505.05.
     - (E) A SWPPP AMENDMENT SHALL BE SUBMITTED TO THE DEPARTMENT, FOR APPROVAL, ADDRESSING COLD WEATHER STABILIZATION (ENV-WQ 1505.05) AND INCLUDING THE REQUIREMENTS OF NO LESS THAN 30 DAYS PRIOR TO THE COMMENCEMENT OF WORK SCHEDULED AFTER NOVEMBER 30".

GENERAL CONSTRUCTION PLANNING AND SELECTION OF STRATEGIES TO CONTROL EROSION AND SEDIMENT ON HIGHWAY CONSTRUCTION PROJECTS

3. PLAN ACTIVITIES TO ACCOUNT FOR SENSITIVE SITE CONDITIONS:
   - 3.1. CLEARLY FLAG AREAS TO BE PROTECTED IN THE FIELD AND PROVIDE CONSTRUCTION BARRIERS TO PREVENT TRAFFICKING OUTSIDE OF WORK AREAS.
   - 3.2. CONSTRUCTION SHALL BE SEQUENCED TO LIMIT THE DURATION AND AREA OF EXPOSED SOILS.
   - 3.3. PROTECT AND MAXIMIZE EXISTING NATIVE VEGETATION AND NATURAL FOREST BUFFERS BETWEEN CONSTRUCTION ACTIVITY AND SENSITIVE AREAS.
   - 3.4. WHEN WORK IS PERFORMED IN AND NEAR WATER COURSES, STREAM FLOW DIVERSION METHODS SHALL BE IMPLEMENTED PRIOR TO ANY EXCAVATION OR FILLING.
   - 3.5. WHEN WORK IS PERFORMED WITHIN 50 FEET OF SURFACE WATERS (WETLAND, OPEN WATER OR FLOWING WATER), PERIMETER CONTROL SHALL BE ENHANCED CONSISTENT WITH SECTION 2.1.2.1. OF THE 2012 NPDES CONSTRUCTION GENERAL PERMIT.

4. MINIMIZE THE AMOUNT OF EXPOSED SOIL:
   - 4.1. CONSTRUCTION SHALL BE SEQUENCED TO LIMIT THE DURATION AND AREA OF EXPOSED SOILS. MINIMIZE THE AREA OF EXPOSED SOIL AT ANY ONE TIME. PHASING SHALL BE USED TO REDUCE THE AMOUNT AND DURATION OF SOIL EXPOSED TO THE ELEMENTS AND VEHICLE TRACKING.
   - 4.2. UTILIZE TEMPORARY MULCHING OR PROVIDE ALTERNATE TEMPORARY STABILIZATION ON EXPOSED SOILS IN ACCORDANCE WITH TABLE 1.
   - 4.3. THE MAXIMUM AMOUNT OF DISTURBED EARTH SHALL NOT EXCEED A TOTAL OF 5 ACRES FROM MAY 1" THROUGH NOVEMBER 30", OR EXCEED ONE ACRE DURING WINTER MONTHS, UNLESS THE CONTRACTOR DEMONSTRATES TO THE DEPARTMENT THAT THE ADDITIONAL AREA OF DISTURBANCE IS NECESSARY TO MEET THE CONTRACTORS CRITICAL PATH METHOD SCHEDULE (CPM), AND THE CONTRACTOR HAS ADEQUATE RESOURCES AVAILABLE TO ENSURE THAT ENVIRONMENTAL COMMITMENTS WILL BE MET.

5. CONTROL STORMWATER FLOWING ONTO AND THROUGH THE PROJECT:
   - 5.1. DIVERT OFF SITE RUNOFF OR CLEAN WATER AWAY FROM THE CONSTRUCTION ACTIVITY TO REDUCE THE VOLUME THAT NEEDS TO BE TREATED ON SITE.
   - 5.2. DIVERT STORM RUNOFF FROM UPSLOPE DRAINAGE AREAS AWAY FROM DISTURBED AREAS, SLOPES, AND AROUND ACTIVE WORK AREAS AND TO A STABILIZED OUTLET LOCATION.
   - 5.3. CONSTRUCT IMPERMEABLE BARRIERS AS NECESSARY TO COLLECT OR DIVERT CONCENTRATED FLOWS FROM WORK OR DISTURBED AREAS.
   - 5.4. STABILIZE, TO APPROPRIATE ANTICIPATED VELOCITIES, CONVEYANCE CHANNELS OR PUMPING SYSTEMS NEEDED TO CONVEY CONSTRUCTION STORMWATER TO BASINS AND DISCHARGE LOCATIONS PRIOR TO USE.
   - 5.5. DIVERT OFF-SITE WATER THROUGH THE PROJECT IN AN APPROPRIATE MANNER SO NOT TO DISTURB THE UPSTREAM OR DOWNSTREAM SOILS, VEGETATION OR HYDROLOGY BEYOND THE PERMITTED AREA.

6. PROTECT SLOPES:
   - 6.1. INTERCEPT AND DIVERT STORM RUNOFF FROM UPSLOPE DRAINAGE AREAS AWAY FROM UNPROTECTED AND NEWLY ESTABLISHED AREAS AND SLOPES TO A STABILIZED OUTLET OR CONVEYANCE.
   - 6.2. CONSIDER HOW GROUNDWATER SEEPAGE ON CUT SLOPES MAY IMPACT SLOPE STABILITY AND INCORPORATE APPROPRIATE MEASURES TO MINIMIZE EROSION.
   - 6.3. CONVEY STORMWATER DOWN THE SLOPE IN A STABILIZED CHANNEL OR SLOPE DRAIN.
   - 6.4. THE OUTER FACE OF THE FILL SLOPE SHOULD BE IN A LOOSE RUFFLED CONDITION PRIOR TO TURF ESTABLISHMENT. TOPSOIL OR HUMUS LAYERS SHALL BE TRACKED UP AND DOWN THE SLOPE, DISKED, HARROWED, DRAGGED WITH A CHAIN OR MAT, MACHINE-RAKED, OR HAND-WORKED TO PRODUCE A RUFFLED SURFACE.

7. ESTABLISH STABILIZED CONSTRUCTION EXITS:
   - 7.1. INSTALL AND MAINTAIN CONSTRUCTION EXITS, ANYWHERE TRAFFIC LEAVES A CONSTRUCTION SITE ONTO A PUBLIC RIGHT-OF-WAY.
   - 7.2. SWEEP ALL CONSTRUCTION RELATED DEBRIS AND SOIL FROM THE ADJACENT PAVED ROADWAYS AS NECESSARY.

8. PROTECT STORM DRAIN INLETS:
   - 8.1. DIVERT SEDIMENT LADEN WATER AWAY FROM INLET STRUCTURES TO THE EXTENT POSSIBLE.
   - 8.2. INSTALL SEDIMENT BARRIERS AND SEDIMENT TRAPS AT INLETS TO PREVENT SEDIMENT FROM ENTERING THE DRAINAGE SYSTEM.
   - 8.3. CLEAN CATCH BASINS, DRAINAGE PIPES, AND CULVERTS IF SIGNIFICANT SEDIMENT IS DEPOSITED.
   - 8.4. DROP INLET SEDIMENT BARRIERS SHOULD NEVER BE USED AS THE PRIMARY MEANS OF SEDIMENT CONTROL AND SHOULD ONLY BE USED TO PROVIDE AN ADDITIONAL LEVEL OF PROTECTION TO STRUCTURES AND DOWN-GRADIENT SENSITIVE RECEPTORS.

9. SOIL STABILIZATION:
   - 9.1. WITHIN THREE DAYS OF THE LAST ACTIVITY IN AN AREA, ALL EXPOSED SOIL AREAS, WHERE CONSTRUCTION ACTIVITIES ARE COMPLETE, SHALL BE STABILIZED.
   - 9.2. IN ALL AREAS, TEMPORARY SOIL STABILIZATION MEASURES SHALL BE APPLIED IN ACCORDANCE WITH THE STABILIZATION REQUIREMENTS (SECTION 2.2) OF THE 2012 CGP. (SEE TABLE 1 FOR GUIDANCE ON THE SELECTION OF TEMPORARY SOIL STABILIZATION MEASURES.)
   - 9.3. EROSION CONTROL SEED MIX SHALL BE SOWN IN ALL INACTIVE CONSTRUCTION AREAS THAT WILL NOT BE PERMANENTLY SEEDED WITHIN TWO WEEKS OF DISTURBANCE AND PRIOR TO SEPTEMBER 15, OF ANY GIVEN YEAR. IN ORDER TO ACHIEVE VEGETATIVE STABILIZATION PRIOR TO THE END OF THE GROWING SEASON.
   - 9.4. SOIL TACKIFIERS MAY BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND REAPPLIED AS NECESSARY TO MINIMIZE SOIL AND MULCH LOSS UNTIL PERMANENT VEGETATION IS ESTABLISHED.

10. RETAIN SEDIMENT ON-SITE AND CONTROL DEWATERING PRACTICES:
    - 10.1. TEMPORARY SEDIMENT BASINS (CGP-SECTION 2.1.3.2) OR SEDIMENT TRAPS (ENV-WQ 1506.10) SHALL BE SIZED TO RETAIN, ON SITE, THE VOLUME OF A 2-YEAR 24-HOUR STORM EVENT FOR ANY AREA OF DISTURBANCE OR 3,600 CUBIC FEET OF STORMWATER RUNOFF PER ACRE OF DISTURBANCE, WHICHEVER IS GREATER. TEMPORARY SEDIMENT BASINS USED TO TREAT STORMWATER RUNOFF FROM AREAS GREATER THAN 5-ACRES OF DISTURBANCE SHALL BE SIZED TO ALSO CONTROL STORMWATER RUNOFF FROM A 10-YEAR 24 HOUR STORM EVENT. ON-SITE RETENTION OF THE 10-YEAR 24-HOUR EVENT IS NOT REQUIRED.
    - 10.2. CONSTRUCT AND STABILIZE DEWATERING INFILTRATION BASINS PRIOR TO ANY EXCAVATION THAT MAY REQUIRE DEWATERING.
    - 10.3. TEMPORARY SEDIMENT BASINS OR TRAPS SHALL BE PLACED AND STABILIZED AT LOCATIONS WHERE CONCENTRATED FLOW (CHANNELS AND PIPES) DISCHARGE TO THE SURROUNDING ENVIRONMENT FROM AREAS OF UNSTABILIZED EARTH DISTURBING ACTIVITIES.

11. ADDITIONAL EROSION AND SEDIMENT CONTROL GENERAL PRACTICES:
    - 11.1. USE TEMPORARY MULCHING, PERMANENT MULCHING, TEMPORARY VEGETATIVE COVER, AND PERMANENT VEGETATIVE COVER TO REDUCE THE NEED FOR DUST CONTROL. USE MECHANICAL SWEEPERS ON PAVED SURFACES WHERE NECESSARY TO PREVENT DUST BUILDUP. APPLY WATER, OR OTHER DUST INHIBITING AGENTS OR TACKIFIERS, AS APPROVED BY THE NHDES.
    - 11.2. ALL STOCKPILES SHALL BE CONTAINED WITH TEMPORARY PERIMETER CONTROLS. INACTIVE SOIL STOCKPILES SHOULD BE PROTECTED WITH SOIL STABILIZATION MEASURES (TEMPORARY EROSION CONTROL SEED MIX AND MULCH, SOIL BINDER) OR COVERED WITH ANCHORED TARPS.
    - 11.3. EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSPECTED IN ACCORDANCE WITH SECTION 645 OF NHDOT SPECIFICATIONS, WEEKLY AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.25 IN. OF RAIN PER 24-HOUR PERIOD. EROSION AND SEDIMENT CONTROL MEASURES WILL ALSO BE INSPECTED IN ACCORDANCE WITH THE GUIDANCE MEMO FROM THE NHDES CONTAINED WITHIN THE CONTRACT PROPOSAL AND THE EPA CONSTRUCTION GENERAL PERMIT.
    - 11.4. THE CONTRACTOR SHOULD UTILIZE STORM DRAIN INLET PROTECTION TO PREVENT SEDIMENT FROM ENTERING A STORM DRAINAGE SYSTEM PRIOR TO THE PERMANENT STABILIZATION OF THE CONTRIBUTING DISTURBED AREA.
    - 11.5. PERMANENT STABILIZATION MEASURES WILL BE CONSTRUCTED AND MAINTAINED IN LOCATIONS AS SHOWN ON THE CONSTRUCTION PLANS TO STABILIZE AREAS. VEGETATIVE STABILIZATION SHALL NOT BE CONSIDERED PERMANENTLY STABILIZED UNTIL VEGETATIVE GROWTH COVERS AT LEAST 85% OF THE DISTURBED AREA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR EROSION AND SEDIMENT CONTROL FOR ONE YEAR AFTER PROJECT COMPLETION.
    - 11.6. CATCH BASINS: CARE SHALL BE TAKEN TO ENSURE THAT SEDIMENTS DO NOT ENTER ANY EXISTING CATCH BASINS DURING CONSTRUCTION. THE CONTRACTOR SHALL PLACE TEMPORARY STONE INLET PROTECTION OVER INLETS IN AREAS OF SOIL DISTURBANCE THAT ARE SUBJECT TO SEDIMENT CONTAMINATION.
    - 11.7. TEMPORARY AND PERMANENT DITCHES SHALL BE CONSTRUCTED, STABILIZED AND MAINTAINED IN A MANNER THAT WILL MINIMIZE SCOUR. TEMPORARY AND PERMANENT DITCHES SHALL BE DIRECTED TO DRAIN TO SEDIMENT BASINS OR STORM WATER COLLECTION AREAS.
    - 11.8. WINTER EXCAVATION AND EARTHWORK ACTIVITIES NEED TO BE LIMITED IN EXTENT AND DURATION, TO MINIMIZE POTENTIAL EROSION AND SEDIMENTATION IMPACTS. THE AREA OF EXPOSED SOIL SHALL BE LIMITED TO ONE ACRE, OR THAT WHICH CAN BE STABILIZED AT THE END OF EACH DAY UNLESS A WINTER CONSTRUCTION PLAN, DEVELOPED BY A QUALIFIED ENGINEER OR A CPESC SPECIALIST, IS REVIEWED AND APPROVED BY THE DEPARTMENT.
    - 11.9. CHANNEL PROTECTION MEASURES SHALL BE SUPPLEMENTED WITH PERIMETER CONTROL MEASURES WHEN THE DITCH LINES OCCUR AT THE BOTTOM OF LONG FILL SLOPES. THE PERIMETER CONTROLS SHALL BE INSTALLED ON THE FILL SLOPE TO MINIMIZE THE POTENTIAL FOR FILL SLOPE SEDIMENT DEPOSITS IN THE DITCH LINE.

BEST MANAGEMENT PRACTICES (BMP) BASED ON AMOUNT OF OPEN CONSTRUCTION AREA

12. STRATEGIES SPECIFIC TO OPEN AREAS LESS THAN 5 ACRES:
    - 12.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WQ 1500: ALTERATION OF TERRAIN FOR CONSTRUCTION AND USE ALL CONVENTIONAL BMP STRATEGIES.
    - 12.2. SLOPES STEEPER THAN 3:1 WILL RECEIVE TURF ESTABLISHMENT WITH MATTING.
    - 12.3. SLOPES 3:1 OR FLATTER WILL RECEIVE TURF ESTABLISHMENT ALONE.
    - 12.4. AREAS WHERE HAUL ROADS ARE CONSTRUCTED AND STORMWATER CANNOT BE TREATED THE DEPARTMENT WILL CONSIDER INFILTRATION.
    - 12.5. FOR HAUL ROADS ADJACENT TO SENSITIVE ENVIRONMENTAL AREAS OR STEEPER THAN 5%. THE DEPARTMENT WILL CONSIDER USING EROSION STONE, CRUSHED GRAVEL, OR CRUSHED STONE BASE TO HELP MINIMIZE EROSION ISSUES.
    - 12.6. ALL AREAS THAT CAN BE STABILIZED SHALL BE STABILIZED PRIOR TO OPENING UP NEW TERRITORY.
    - 12.7. DETENTION BASINS SHALL BE DESIGNED AND CONSTRUCTED TO ACCOMMODATE A 2 YEAR STORM EVENT.

13. STRATEGIES SPECIFIC TO OPEN AREAS BETWEEN 5 AND 10 ACRES:
    - 13.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WQ 1500 ALTERATION OF TERRAIN AND SHALL USE CONVENTIONAL BMP STRATEGIES AND ALL TREATMENT OPTIONS USED FOR UNDER 5 ACRES WILL BE UTILIZED.
    - 13.2. DETENTION BASINS WILL BE CONSTRUCTED TO ACCOMMODATE THE 2-YEAR 24-HOUR STORM EVENT AND CONTROL A 10-YEAR 24-HOUR STORM EVENT.
    - 13.3. SLOPES STEEPER THAN A 3:1 WILL RECEIVE TURF ESTABLISHMENT WITH MATTING OR OTHER TEMPORARY SOIL STABILIZATION MEASURES DETAILED IN TABLE 1. THE CONTRACTOR MAY ALSO CONSIDER A SOIL BINDER IN ACCORDANCE WITH THE NHDES APPROVALS OR REGULATIONS. OTHER ALTERNATIVE MEASURES, SUCH AS BONDED FIBER MATRIXES (BFMS) OR FLEXIBLE GROWTH MEDIUMS (FGMS) MAY BE UTILIZED, IF MEETING THE NHDES APPROVALS AND REGULATIONS.
    - 13.4. SLOPES 3:1 OR FLATTER WILL RECEIVE TURF ESTABLISHMENT OR OTHER TEMPORARY SOIL STABILIZATION MEASURES DETAILED IN TABLE 1. THE CONTRACTOR MAY ALSO CONSIDER A SOIL BINDER IN ACCORDANCE WITH THE NHDES APPROVALS OR REGULATIONS.

14. STRATEGIES SPECIFIC TO OPEN AREAS OVER 10 ACRES:
    - 14.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WQ 1500 ALTERATION OF TERRAIN AND SHALL USE CONVENTIONAL BMP STRATEGIES AND ALL TREATMENT OPTIONS USED FOR UNDER 5 ACRES AND BETWEEN 5 AND 10 ACRES WILL BE UTILIZED.
    - 14.2. THE DEPARTMENT ANTICIPATES THAT SOIL BINDERS WILL BE NEEDED ON ALL SLOPES STEEPER THAN 3:1. IN ORDER TO MINIMIZE EROSION AND REDUCE THE AMOUNT OF SEDIMENT IN THE STORMWATER TREATMENT BASINS.
    - 14.3. THE CONTRACTOR WILL BE REQUIRED TO HAVE AN APPROVED DESIGN IN ACCORDANCE WITH ENV-WQ 1506.12 FOR AN ACTIVE FLOCCULANT TREATMENT SYSTEM TO TREAT AND RELEASE WATER CAPTURED IN STORM WATER BASINS. THE CONTRACTOR SHALL ALSO RETAIN THE SERVICES OF AN ENVIRONMENTAL CONSULTANT WHO HAS DEMONSTRATED EXPERIENCE IN THE DESIGN OF FLOCCULANT TREATMENT SYSTEMS. THE CONSULTANT WILL ALSO BE RESPONSIBLE FOR THE IMPLEMENTATION AND MONITORING OF THE SYSTEM.

TABLE 1
GUIDANCE ON SELECTING TEMPORARY SOIL STABILIZATION MEASURES

APPLICATION AREAS	DRY MULCH METHODS				HYDRAULICALLY APPLIED MULCHES[2]				ROLLED EROSION CONTROL BLANKETS[3]			
	HMT	WC	SG	CB	HM	SMM	BFM	FRM	SNSB	DNSB	DNSCB	DNCB
SLOPES[1]												
STEEPER THAN 2:1	NO	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	YES
2:1 SLOPE	YES*	YES*	YES	YES	NO	NO	YES	YES	NO	YES	YES	YES
3:1 SLOPE	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	NO
4:1 SLOPE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO
WINTER STABILIZATION	4T/AC	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES
CHANNELS												
LOW FLOW CHANNELS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES
HIGH FLOW CHANNELS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES

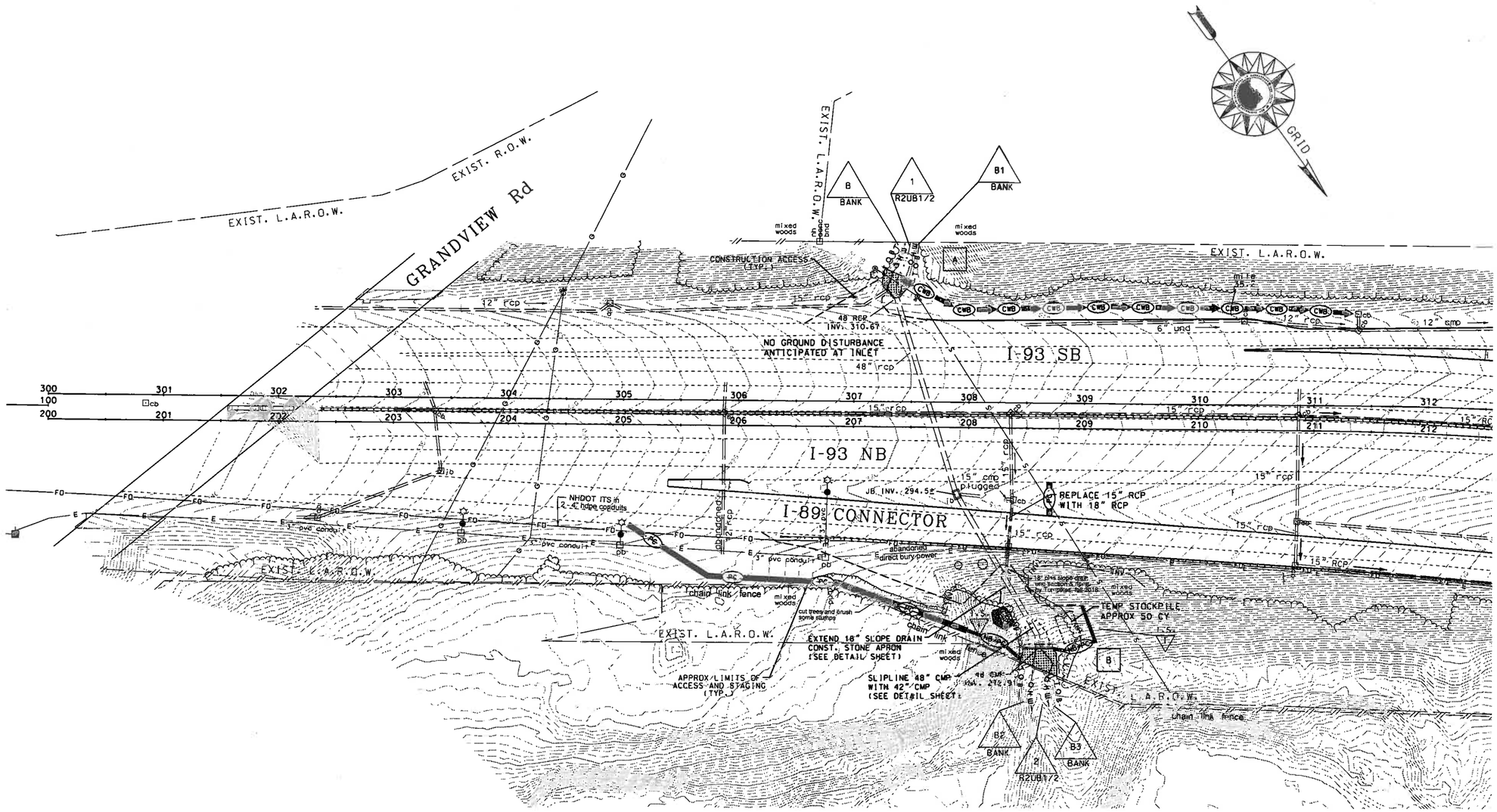
ABBREV.	STABILIZATION MEASURE	ABBREV.	STABILIZATION MEASURE	ABBREV.	STABILIZATION MEASURE
HMT	HAY MULCH & TACK	HM	HYDRAULIC MULCH	SNSB	SINGLE NET STRAW BLANKET
WC	WOOD CHIPS	SMM	STABILIZED MULCH MATRIX	DNSB	DOUBLE NET STRAW BLANKET
SG	STUMP GRINDINGS	BFM	BONDED FIBER MATRIX	DNSCB	2 NET STRAW-COCONUT BLANKET
CB	COMPOST BLANKET	FRM	FIBER REINFORCED MEDIUM	DNCB	2 NET COCONUT BLANKET

NOTES:
1. ALL SLOPE STABILIZATION OPTIONS ASSUME A SLOPE LENGTH ≤10 TIMES THE HORIZONTAL DISTANCE COMPONENT OF THE SLOPE, IN FEET.
2. PRODUCTS CONTAINING POLYACRYLAMIDE (PAM) SHALL NOT BE APPLIED DIRECTLY TO OR WITHIN 100 FEET OF ANY SURFACE WATER WITHOUT PRIOR WRITTEN APPROVAL FROM THE NH DEPARTMENT OF ENVIRONMENTAL SERVICES.
3. ALL EROSION CONTROL BLANKETS SHALL BE MADE WITH WILDLIFE FRIENDLY BIODEGRADABLE NETTING.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION ∘ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL STRATEGIES

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
12-21-2015	42300erosstrat	42300	6	7



EROSION CONTROL PLAN LEGEND

PC — PERIMETER CONTROL
- SILT FENCE
- EROSION CONTROL MIX BERM
- EROSION CONTROL MIX SOX
- TURBIDITY CURTAIN
- SHEET PILE
- COFFER DAM

NB/PC — NATURAL BUFFER/PERIMETER CONTROL
- SILT FENCE
- EROSION CONTROL MIX BERM
- EROSION CONTROL MIX SOX
- TURBIDITY CURTAIN
- SHEET PILE
- COFFER DAM

CP — CHANNEL PROTECTION
- STONE CHECK DAMS
- STRAW WATTLES
- CHANNEL MATTING
- CLASS D EROSION STONE
- CLASS C STONE

CWB — CLEAN WATER BYPASS
- PUMP THROUGH PIPE
- DRAIN THROUGH PIPE OR CHANNEL

GENERAL NOTES:

1) CLEAN WATER BYPASS WILL BE PUMPED TO THE CLOSEST I-93 DITCHLINE CATCH BASIN (AS SHOWN). UNLESS OTHER WISE APPROVED AS PART OF THE CONTRACTOR'S SWPPP.

2) NO CHANGE TO EXISTING TOPOGRAPHY.

3) CONTOUR INTERVAL 1 FOOT.

50 0 50 100
SCALE IN FEET

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	DESCRIPTION

		DATE
SDR PROCESSED		
NEW DESIGN	JJN	12/2018
SHEET CHECKED	CAC	12/28/18
AS BUILT DETAILS		

STATE OF NEW HAMPSHIRE
BOW
DEPARTMENT OF TRANSPORTATION ◦ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLAN

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
42300ercplan	42300	7	7